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AN EXPERIMENTAL ANALYSIS OF SELECTED PROBLEMS OF LARGE-SHELTER MANAGEMENT, ENVIRONMENTAL THREAT, AND SMALL-SHELTER HABITABILITY UNDER CONDITIONS OF STRESS

(Final Report)

Prepared for:

Office of Civil Defense
Department of the Army
Office of the Secretary of the Army
Under
Contract No. OCD-PS-64-57
OCD Work Unit 1519A

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Institute for Performance Technology
AMERICAN INSTITUTES FOR RESEARCH
Pittsburgh, Pennsylvania

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AN EXPERIMENTAL ANALYSIS OF SELECTED PROBLEMS OF LARGE-SHELTER MANAGEMENT, ENVIRONMENTAL THREAT, AND SMALL-SHELTER HABITABILITY UNDER CONDITIONS OF STRESS

(Summary of Final Report)

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Contract No. OCD-PS-64-57
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Prepared by:

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Social Systems Program
Institute for Performance Technology
AMERICAN INSTITUTES FOR RESEARCH
Pittsburgh, Pennsylvania

September 1966

OCD REVIEW NOTICE

This report has been reviewed in the Office of Civil Defense and approved for publication. Approval does not signify that the contents necessarily reflect the views and policies of the Office of Civil Defense.

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The report of this project contains three sections, each being a report of the particular effort involved with that specific task. These sections are:

Section I: THE SHELTER MANAGEMENT CONTINGENCY GAME

Section II: A PILOT STUDY OF ENVIRONMENTAL THREAT

Section III: HABITABILITY UNDER CONDITIONS OF STRESS

Each of these sections is summarized on the following pages.

SECTION I: THE SHELTER MANAGEMENT CONTINGENCY GAME

Purpose

The purpose of this effort was to develop a technique for use in the investigation of the problems involved with the management of large shelters. The goal was to produce an initial version of a shelter management contingency game, in which the "player," i.e., the manager, can instruct or "manage" the shelter system and, in turn, receive information from the system on the effectiveness of his actions. It is, in essence, a method by which the interactions between the manager and the shelter environment, including the shelter population, can be investigated without the necessity of an actual habitability exercise.

Approach

The approach used consisted of the development of the following parts of the game:

1. A pre-game information package which described the physical plant of a 6,200 person high-rise shelter, told the player that he was the manager of this shelter, and made known to him his location in the building at the time of the first attack warning, together with the materials and personnel initially available to him at the time.

2. A set of confidential rules which determined the background against which the game was played. These included the behavior patterns being shown by the public as they sought shelter in the building, together with the time required for travel and communication between various parts of the building. These rules were not made specific to the player, but could be inferred by him to some degree on the basis of the responses he received from the system.

3. A set of contingencies between manager action and shelter system response, i.e., the information fed back to the player as a function of what he instructed the shelter "system" to do.

4. The physical hardware or "board" on which the game was played. This consisted of a cardboard subject-experimenter interface panel, and decks of 3x5 file cards by means of which the responses of the system could be presented to the player. The player instructed the system in writing, using 3x5 cards supplied to him. The experimenter classified the instructions from the player, and presented the appropriate responses of the system to him.

The game developed covered the first few critical hours of a shelter stay, from the time of the initial attack warning up to bedtime of the first day. It was pilot tested with six subjects.

Results

In spite of the rudimentary nature of the game in its current stage of development, the pilot tests indicated that the approach was feasible and workable. Specific problem areas, particularly those involving the logistics of communication, initial organization, and distributions of shelter supplies appear to be quite bothersome in the management of a shelter of the size portrayed in the game.

The technique appears to be quite promising, and recommendations were made concerning its further development.

SECTION II: A PILOT STUDY OF ENVIRONMENTAL THREAT

Purpose

The purpose of this effort was to investigate the possibility of experimentally producing an analog to the environmental threat of radiation, a threat which would be associated with an actual shelter under attack conditions. Simulation of the radiation threat which will surround a shelter, however, is difficult to accomplish within the bounds of reasonable safety. At the same time, the threat of bodily harm quite reasonably may have a substantial impact upon the behavior of fallout shelter occupants during an actual nuclear attack. To the extent that this impact may be different than that of other stress factors, this variable warrants specific attention in behavioral shelter research.

The simulation of physical threat has always been difficult to achieve under safe laboratory conditions. The Institute has been concerned with this issue since the inception of its shelter research. The two primary aspects of the radiological threat in a shelter situation are:

1. knowledge on the part of the shelterees that the integrity of the shelter is all that stands between them and a hostile environment, and
2. the perception of premature shelter exit as a threat rather than an escape.

The key to effective physical threat simulation in shelter research, then, is to enclose the subjects in a facility which they perceive as protecting them from an actual environmental threat. This must be accomplished, of course, without any real danger to the shelter inhabitants. Such a research technique could help to determine what effect the threat of bodily harm might have on the behavior of shelter inhabitants and what steps might be taken to counteract those effects.

Approach

The Institute recently acquired access to a basic test facility which appeared well suited for use in studies of environmental threat. This facility consisted of a small "undersea cottage" submerged at a depth of 20 feet within an inland lake.

The shelter occupant with little diving experience may well feel anxious when enclosed in such an environment, even at depths at which no physiological dangers are present. In addition, exit from the submerged shelter without the use of a breathing apparatus, while possible, would not offer a desirable avenue of escape to the shelterees. This condition seems quite analogous to a situation where premature exit from a fallout shelter would pose a hazard to its occupants.

As part of its stress research program, the Institute conducted a small 24-hour pilot study at this test facility. The major purposes of this pilot test were to:

1. determine the technical feasibility of conducting such studies, and
2. assess the potential impact of environmental threat as a stress factor in shelter habitability.

The subjects used were six AIR staff members, all of whom had had previous experience with typical habitability studies, and all of whom had received minimal training in underwater escape procedures.

Results

The results of this study indicated that:

1. It is technologically feasible to conduct a shelter study involving a "real" threat element while at the same time assuring the safety of the shelterees.

2. This environmental threat used in this study seemed to be moderately anxiety-producing even in subjects who were familiar with the threat element and who had previous shelter experience.

3. Anxiety on the part of the shelterees was related to specific stimulus factors associated at least indirectly with the threat element.

4. The shelterees in this study exhibited marked attentiveness to certain procedures (atmospheric monitoring) related to their well-being. This attentiveness appears greater than that exhibited to radiological monitoring tasks in other shelter studies.

5. Responsibility for the "real" protection of the shelterees appears to be more stressful for the shelter manager than his responsibilities in other simulated shelter situations.

Although these results are tentative in nature, it is felt that they should be given serious consideration in planning future shelter research.

SECTION III: HABITABILITY UNDER CONDITIONS OF STRESS

Purpose

The present series of four studies was an attempt to investigate the feasibility of making habitability studies more realistic--both in terms of the number and range of problems presented to the shelter group, and in terms of the total physical environment of the shelter itself. The studies were frankly exploratory, but had as their basic purposes:

1. The determination of what the shelterees did in response to the various aspects of the simulated environment.
2. The identification of those aspects of the environment which appear to be successful in increasing the involvment of the participants with the exercise--i.e., those aspects of the simulated environment which appear to produce realistic behavior patterns on the part of the participants.
3. The identification of behavior patterns associated with the simulated environment which appeared to have implications for current Civil Defense policies and/or appeared to be worthy of future research effort.

Approach

The study series consisted of four 24-hour occupancy exercises, involving approximately 30 subjects each. The independent variables used in these studies were actually the scenario of events programmed into each of the studies. These are all discussed in length in the body of the report, and are summarized for each study in the table on the following page.

Summary Programs for Studies

Event	Study 13 30-31 July 1965	Study 14 6-7 Aug. 1965	Study 15 13-14 Aug. 1965	Study 16 20-21 Aug. 1965
1. Staggered Entry	Yes	Yes	Yes	Yes
2. Primary-Purpose Configuration	Yes	Yes	Yes	Yes
3. Management Factors:				
a. Actor-manager used	a. as manager	a. as manager	a. as manager	a. as second agitator
b. Manager assigned or emerged	b. assigned	b. emerged	b. assigned	b. emerged*
c. Manager's arrival	c. one hour after first person entered	c. one of first people to enter	c. one of first people to enter	c. one of first people to enter*
d. Manager removed from shelter	d. at 4:00 AM on the 31st	d. no	d. at 9:00 AM on the 14th	d. at 1:00 PM on the 21st*
e. Manager attempted re-entry	e. no	e. ---	e. at 3:00 PM on the 14th (as a hostage)	e. no*
f. Management style	f. Style 2	f. Style 2	f. Style 1	f. Style 1*
4. Agitator Factors	see text	see text	see text	see text--2 used
5. Programed Emergencies:				
a. Late arrivals	a. 9:30 PM on 30th, 12:00 midnight on 30th	a. 9:30 PM on 6th, 12:00 midnight on 6th, 3:00 PM on 7th with a hostage	a. 9:30 PM on 13th, 12:00 midnight on 13th, 1:00 PM on 14th, 3:00 PM on 14th with a hostage	a. 9:30 on 20th, 12:00 midnight on 20th, 1:00 PM on 21st, no hostage

Summary Programs for Studies (continued)

Event	Study 13 30-31 July 1965	Study 14 6-7 Aug. 1965	Study 15 13-14 Aug. 1965	Study 16 20-21 Aug. 1965
b. Looter threat	Yes	Yes	Yes	Yes
--with sound effects and 6:00 AM "attack"	No	Yes	Yes	Yes
c. Dust storm	Yes	Yes	Yes	Yes
--with "missing" volunteer	No	Yes	Yes	No
d. Power failure	d. one at 1:00 PM on the 31st	d. one at 4:00 AM on the 7th, one at 9:00 AM on the 7th	d. one at 4:00 AM on the 14th, one at 9:00 AM on the 14th	d. one at 4:00 AM on the 21st, one at 9:00 AM on the 21st
e. Fire threat	No	Yes	Yes	Yes
f. Exit problem	Yes	Yes	Yes	Yes

*Characteristics of person who did emerge as manager.

Subjects were also given pre- and post-shelter tests, which were designed to measure the attitude of students toward civil defense, shelter leader characteristics, the person's "feeling" about being in a fallout shelter, and the degree or extent of his civil defense information.

Results

The results of these studies can be summarized under two headings: Implications for improving the research technique itself, and implications for OCD policies.

Implications for the research technique.

1. The use of agitators and "assigned" or "emergent" managers in league with the experimenters is not desirable beyond the current point. In spite of the skill with which the people used played their roles, the shelterees have learned to expect such things from psychologists, and as soon as a "plant" is suspected, a great deal of information is lost.

2. Increased involvement with the beginning and end points of a study, as well as more consistent involvement with the intervening portion, might well be engendered by added structure before the study begins. Some shelterees, particularly those who assumed leadership positions, were concerned with "doing a good job" from beginning to end. They were intrigued and challenged by the attempted realism. It might be possible to obtain this same degree of involvement on the part of all the participants by a suitable pre-shelter briefing, and the application of a threat, such as a group and individual survival score at the end of the study. As part of such an effort, an analysis of personal motivations for participation in fallout shelter exercises would be highly desirable, both to guide the attempts to increase personal involvement, and to provide useful information for other research planning in this area.

3. Further effort should be extended toward the selection of other technical and psycho-social problems for use in addition to, or in place of, the ones used in the current study. The problems presented by very young, very old, sick, dangerous, or disturbed people come to mind immediately.

Implications for OCD.

1. A symbol of authority for assigned managers would be very useful. This would help an assigned manager establish control both if he were present initially, and, in the case of his late arrival and encountering of an existing, emergent organization.

2. Additional evidence was found suggesting the effectiveness and desirability of the technically competent, authoritarian style of leadership. Certain elements of danger inherent in this style were discovered and pointed out, however; these being the willingness of the shelterees to do whatever he orders, including the violation of orders from a coordinating agency, and to accept decisions and evaluations he makes, even though these might be dangerous to the group.

3. Public education regarding the nature of public fallout shelters, particularly the dual-purpose aspect, is desirable.

4. The studies indicated that continuous EBS programming and/or instructions emphasizing the necessity of continuous and careful monitoring of the radio are desirable to insure transmission of EBS information.

5. OCD concern expressed over the continuation of shelter organization and cooperation at the point of exit is well grounded, and further effort needs to be extended toward analysis of, and development of, recommendations to improve this period of the shelter situation.

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ABSTRACT

The research program reported was composed of three major efforts:

1. The initial development of and the feasibility testing of a Large-Shelter Contingency Game for use in the analysis of problems associated with large-shelter management.
2. The development of techniques for and the feasibility testing of the use of an underwater shelter as a method for producing an experimental analog of the threat associated with actual shelter habitability.
3. The design and execution of four 24-hour habitability studies to investigate the effects of increased realism of a shelter stay, in terms of the number and range of problems presented to the shelterees and the realistic representation of other aspects of the expected shelter environment under the condition of nuclear attack.

The first effort resulted in the development of a contingency game covering the first few critical hours of large-shelter habitability--from the initial attack warning to bedtime of the first day. The game was pilot tested with six subjects, and was found to yield worthwhile information regarding the dimensions of the management problems associated with the initial organization of large shelters. The game appears to be a feasible method by which management of large shelters can be investigated without the cost of actual habitability exercises. Recommendations were made, on the basis of the obtained results, for further development of the game.

The second effort was executed through the confinement of six subjects in a stainless steel tank for 24 hours, the tank being 20 feet under water. The subjects had had previous experience with typical habitability exercises, and their responses to these situations were compared with their responses to the current test environment. The condition of being under water appeared

to produce anxiety on the part of the subjects, even though there was little real physical danger present due to this condition. The anxiety was reflected, in part, by marked attentiveness to atmospheric monitoring tasks in the shelter, an attentiveness that appeared to be greater than that exhibited to the analogous task of radiological monitoring in other shelter studies. The study indicated that the approach is a technically feasible method by which to conduct a shelter study involving a "real" threat element, while at the same time assuring the safety of the shelterees.

In the third effort, four 24-hour habitability studies were executed involving approximately 30 subjects each. The effect of a range of problems and aspects of an expectable real shelter environment were studied. These included the shelter being configured in its "primary purpose" role, several types of management factors, the presentation of several technical "emergencies" to the shelter group, the use of a realistic method of transmitting EBS messages, and the presentation of a technical problem at the point of exit from the shelter. These studies indicated that:

1. Some knowledge of the concept of dual-purpose shelters is desirable on the part of the public.

2. EBS programming should be continuous in order to insure the reception of all messages.

3. Direct, task-oriented, and authoritarian leadership is the most effective, but there are some potentially dangerous aspects in its use.

4. Concern over the maintenance of group discipline, cooperation, and problem-related effectiveness after exit from the shelter is definitely called for.

Indications for improvement in the use of this technique as a research tool were also discussed.

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TABLE OF CONTENTS

	Page
ABSTRACT	i
ACKNOWLEDGEMENTS	iii
SECTION I: THE SHELTER MANAGEMENT CONTINGENCY GAME	
INTRODUCTION	1
Desired Qualities of Large-Shelter Research Techniques	5
THE CONTINGENCY GAME	6
Description of the Contingency Game Technique	7
DEVELOPMENT OF THE CONTINGENCY GAME	8
Pre-Game Information Package	8
Confidential Rules	9
Management Response Spectra	11
The Contingencies	13
RESULTS	14
Pilot Testing of the Game	14
Information Obtained from the Pilot Tests	15
Directions for Further Research	17
SECTION II: A PILOT STUDY OF ENVIRONMENTAL THREAT	
BACKGROUND AND PROBLEM	19
SHELTER PREPARATION	21
Basic Facility	21
Environmental Problems	21
Ventilation	23
Other Facilities	25
General	25
Power Supply	25
Lighting	25
Communications	27
Sanitation	28
Food, Water, and Medical Supplies	28
Atmospheric Monitoring Instruments	28

TABLE OF CONTENTS (continued)

	Page
SUBJECTS	29
GENERAL PROCEDURES	30
DATA COLLECTION	31
RESULTS	35
General	35
Environmental Threat	36
Indications of Stress	36
Sources of Stress	37
CONCLUSIONS	39
SECTION III: HABITABILITY UNDER CONDITIONS OF STRESS	
PROLOGUE	41
INTRODUCTION	43
METHOD	45
I. The Laboratory	45
II. The Subjects	45
III. Observation Techniques	48
IV. Scenario Programs Used in the Studies	48
Instructions as to What to Bring to the Shelter	48
"Staggered" Entry	49
Primary-Purpose Configuration	49
Management Factors	50
Agitator Factors	52
Programmed Emergencies	52
1. Late Arrivals	53
2. Looter Threat	54
3. "Dust Storm" Crisis	54
4. Power Failures	55
5. Fire Threat	55
6. Civil Defense Stocks Missing	55
7. EBS System	55
8. Exit Problem	56
Summary Programs for the Studies	56
RESULTS	59
1. Synopsis of Each Study	59

TABLE OF CONTENTS (continued)

	Page
Study 13	59
Study 14	66
Study 15	73
Study 16	78
II. General Qualitative Results and Implications	83
Staggered Entry	83
Primary Purpose Configuration	83
Management Factors	84
Agitator Factors	86
Programmed Emergencies	86
Emergency Broadcasting System	89
Comments on Participants' Responses to Attempted Realism	89
III. Quantitative Results and Interpretations	91
Materials Brought into the Shelter	91
Pre- and Post-Shelter Tests	92
GENERAL DISCUSSION AND CONCLUSIONS	101
Research Techniques	101
Implications for OCD	104
APPENDIX A-1: Pre-Game Information Package	106
APPENDIX B-1: List of Manager Actions and System Contingency Cards	121
APPENDIX C-1: Subject-Operator Interface Panel	139
APPENDIX A-2: Installation of Facilities for Submerged Shelter Lab	141
APPENDIX B-2: Evacuation and Contingency Procedures for Submerged Shelter Study	151
APPENDIX C-2: Photographs of Submerged Study	155
APPENDIX A-3: Description of Shelter Laboratory	158
APPENDIX B-3: Pre- and Post-Shelter Questionnaires	163
APPENDIX C-3: Sound Effects Tape, Phone Messages, Emergency Broadcast System Script	177
REFERENCES (for all three sections of the report)	189

LIST OF FIGURES

		Page
Figure 1.	Basic Research Facility	22
Figure 2.	Cut-Away Drawing of Shelter	26
Figure 3.	Shelter Activity Schedule	32
Figure 4.	Discomfort Factors	34

LIST OF TABLES

Table I.	Composition of Subject Groups Used in the Four Studies . .	47
Table II.	Summary Programs for Studies	57
Table III.	Categories of Items and Number of People Bringing Each Category to Shelter Stay	91
Table IV.	Mean Number of Correct Answers on Part I--Civil Defense Information	94
Table V.	Mean Scores Obtained on Parts II and III--Civil Defense Attitude and Attitude Toward Leadership	95
Table VI.	Mean Scores Obtained on Part IV--Feeling Toward Being in a Fallout Shelter	95
Table VII.	Mean Scores Obtained on Part V of the Post-Shelter Test .	96
Table VIII.	Spectrum of Responses to Three Specific Aspects of the Shelter Environment	97
Table IX.	Nominations of Those from Whom Participants Would Be Most and Least Willing to Take Orders in an Actual Shelter	99

SECTION I

THE SHELTER MANAGEMENT CONTINGENCY GAME

INTRODUCTION

The OCD Annual Statistical Report for 1963 (U.S. Department of Defense, 1963) tabulates data from the National Fallout Shelter Survey Program. Although more than half (53 per cent) of the shelter facilities surveyed have a capacity of less than 200 spaces, they account for less than 7 per cent of the total shelter spaces. The majority of surveyed spaces (55 per cent) occur in shelter facilities with a capacity in excess of 3,000 persons, with a mean capacity for the very large shelters of about 9,000 persons.

Defining a "large shelter" as one with a capacity of 1,000 or more, we find that, at the date of the survey, three-fourths of the sheltered population would occupy large shelters, the mean capacity of which would be 4,000 persons.

On the face of it, important differences in management properties would appear to exist between such large shelters and those with capacities of a few hundred or less. If we visualize a small building, single-spaced basement shelter, we see that the small shelter manager can communicate with all his shelterees simply by standing up and talking. His shelter supplies will be located near all shelterees. He can see all shelter activities at all times. The delay between the emergence of a problem and his awareness of it, and between his decision and its implementation is relatively small. His number of "problem cases" among the shelterees is apt to be small, in proportion to the shelter population. None of these will be true for the manager of a large, multi-storied, high-rise facility. Levels and intensity of management multiply, communication becomes complicated and slow in both directions, the manager has little firsthand knowledge of shelter happenings, and his population is sufficiently large and diverse that anything that can go wrong is apt to do so.

In the small group, it is possible for the manager to oversee every activity on a personal, face-to-face basis. In the case of a large shelter, such supervision would be a practical impossibility. Following the notion of executive management, where supervisory responsibilities would be delegated, in part, to subordinates, some evidence exists that the manager would be fully occupied in the supervision of ten such subordinates (Healey, 1956).

These apparent differences resulting from configuration and size of population suggest that the management of shelters containing thousands of spaces requires separate study. This need is underscored by the high percentage of the population to be sheltered in such large facilities. In spite of this, there has been only a small amount of speculative work done on large shelter problems until now. There are good reasons for this.

Large shelters present a difficult subject for study. Conventional occupancy studies would cost over $10,000 a day in subject honoraria alone for a minimal 1,000-person study, making a useful series of tests exorbitantly expensive. Costs would be further raised because observation difficulties multiply with number of subjects.

When such a test is aimed chiefly at acquiring data on the manager and management of the large-shelter system, this heavy cost for subjects and staff pays for data on only one man in one situation.

In any case, the value of such a series would be limited by the fidelity with which actual shelter conditions are simulated. Accuracy of simulation is, in turn, limited by two factors: (1) the capacity of hired subjects to behave and react in the fashion expected of confused and frightened seekers of shelter, and (2) the practical impossibility of inflicting casualties, fatalities, or even hazardous experimental conditions on the subjects.

Before the results of such large-scale occupancy tests could be used with confidence, replications would have to be run, duplicating the experimental conditions, to rule out the operation of uncontrolled chance factors affecting the results. Such replications would bear all the previously

mentioned penalties of scaling up (cost, simulation difficulty, and danger) plus the difficulties of matching a population numbering in the thousands, and producing in each of these a set similar to that of his opposite number in the study to be replicated.

The only other method previously available for evaluating the performance of a shelter manager is the paper-and-pencil test. Such tests, while posessing the virtues of economy and ready replicability, have serious shortcomings. The first is the almost universal "set" of "taking a test" among educated people. This set brings out a series of skills such as maintaining a cool, detached viewpoint, answering in the abstract, covering ignorance with content-free responses, and selecting familiar areas for extensive answers. These skills may not appear, or may be useless, in actually managing a shelter.

The test situation itself contributes its share of unreality. The testee is given all his materials at the start, including a list of questions--all the problems he as a manager has to face; while in reality, the problems emerge sequentially. In managing a shelter, a skillful person may anticipate problems, dealing with them before they arise, or handling several at once. Another person might manage so badly as to create additional problems. In either case, the manager experiences responsiveness from the shelter system, i.e., it reacts to his orders.

The test, on the other hand, being a fixed list of questions, gives the testee the advantage of reminding him of the things he needs to think about, and counters with the disadvantage of offering no information on the results of his decisions. The situation is unrealistic in that nothing the manager-testee does affects his succeeding problems. That is, his actions do not affect the shelter about which he is being questioned. The test-taker is in the position of an on-looker; the antithesis of a manager. This, in turn, supports his pre-existing set of detachment in "taking a test."

Problems of realism and simulation are avoided in studies of disasters, natural or war time, and many similarities exist between these and situations anticipated in the event of nuclear attack. Important differences do

appear, however:

1. Because of the radiation hazard, nuclear attack may result in relatively long-term confinement, as compared to that resulting from a flood, hurricane, earthquake, or other type of natural disaster.

2. In most natural disasters, the dangerous element (flood water, high wind, etc.) is visible and, as a consequence, easily detectable without special equipment.

3. Nuclear attack, due to widespread impact, or to residual radioactivity, or both could tend to prohibit the extensive assistance from outside the stricken areas which normally arrives on the heels of a disaster.

From the researcher's standpoint, the disaster study has other inadequacies: In their nature, disasters are sudden and unplanned, and thus can be examined only after the fact. Thus no experimental manipulation or control of the variables is possible, and humanitarian considerations rule out replication.

Such studies have, however, given us a good idea how people react, at least initially, in situations similar to a civil defense emergency. What is lacking are the measures a manager could or should take in modifying this behavior to coincide with the requirements of survival under nuclear attack.

Desired Qualities of Large-Shelter Research Techniques

With the foregoing discussion of the properties of current research methods in mind, a list of qualities desirable in a new technique for studying large-shelter management may be drawn:

1. Economy. Man-hours per run should be minimized for subjects, staff, and manager. This could be done by reducing real time consumed, the number of people involved, the facility requirement, or a combination of these.

2. Fidelity. The technique should present subject-managers, as realistically as possible, with a manager's view of a large shelter in the attack situation. The manager should not be given "problems" as such, but he should recognize his problems in shelter management out of selected incoming data. This data should be presented to him as a manager's perceptions: some things heard or seen directly, others reported to him, and all received with appropriate temporal spacing. When the manager acts upon a problem he has recognized, the technique should give the manager revised information reflecting the effects of his action. This new information should be delayed for a period appropriate to transmission delays and duration of action under shelter conditions of the moment.

3. Flexibility of Approach. The more approaches to management study encompassed under the technique, the better. These might include: studying a manager and his activities alone, studying manager and core staff in their interactions, focusing on special problem areas, such as communications or human relations, or using this technique in conjunction with another--such as occupancy exercises.

4. Flexibility of Employment. The technique would ideally perform several functions: as a research tool it should generate data leading to improved understanding of large shelter problems. Like a test, it should serve for evaluation of guidance and instructional materials, as well as for the diagnosis or qualification of manager trainees.

5. Replicability. Any set of circumstances occurring in one study should be susceptible to re-creation in another study.

6. Validity. Validity of the results obtained by the technique should be easily determinable, particularly by comparison with incidents from actual large-shelter exercises.

THE CONTINGENCY GAME

The Shelter Management Contingency Game developed under this contract exhibits all of these qualities to some extent, even in the current early stages of development. With further expansion and refinement it should be highly satisfactory from all of the above standpoints.

In its current stage of development, the game is far from a complete coverage of an entire shelter stay. Rather, it covers the first few critical hours of a shelter stay, and is equipped, at the moment, to handle manager-shelter interaction from the time of the initial attack warning (arbitrarily set at 4:00 PM), through shelter entry, shelter organization, up to bedtime of the first day (approximately 12:00 midnight).

One underlying assumption related to the present structure of the game is that managers of very large shelters should be people with experience in organization and decision-making, since these would be their major tasks in their emergency role. To aid in the implementation of these tasks, they should select competent subordinates, instruct and oversee them.

Under this assumption, the manager would not perceive the entire shelter operation at all times through his own senses, but rather through the reports of a relatively small number of assistants. His direct awareness would include only the area around the space in the shelter which he occupies--the management area (ideally, a room separate from the rest of the shelter)--with occasional trips throughout the shelter in accordance with the good leadership practices of establishing visibility and boosting morale through face-to-face contact.

The basic assumption thus yielded easily simulated conditions: a quiet room, out of direct contact with the mass of shelterees, and communications with a limited number of subordinates. It remained to develop a responsive system which would supply information on the current state of the shelter, and make the nature of this information dependent on the manager's prior actions.

Description of the Contingency Game Technique

The "system," as developed, consists of an operator (i.e., the experimenter), several decks of three-by-five cards, a system-player interface panel, and a set of pre-game instructions and information given to the player, and a set of confidential rules which guide the operator of the game. The game may be played on a tabletop between one or more persons (serving as shelter management), and the "system." A diagram of the subject-operator interface panel is shown in Appendix C-1.

Before the game begins, the player is permitted to study an information package. This tells him he is the appointed manager for a building and supplies him emergency-related data for "his" office building and its shelter spaces which an adequate shelter manager should know. The package also tells him of the two assistants he has at his disposal in his business office. (He has the option, of course, of appointing other assistants from the shelter population once the game has begun.) This information package is presented in Appendix A-1.

During play, the manager receives an intermittent flow of information cards (three inches by five inches) from the operator, who is seated behind the panel. Each information card bears data on the current state of the shelter building, generally cast in the form of a report from one or another of the manager-appointed assistants. The manager may communicate in writing with any individual or group in the shelter at any time and receive an appropiate reply.

The interface serves as the manager's senses and vocal organs, connecting him to his shelter. He receives information and transmits his orders or questions on written cards dropped through slots in the panel, and remains aware of shelter time by means of a simulated clock mounted in the panel. This clock is controlled by the operator in accordance with a set of rules unknown to the player.

The information cards the manager receives are responses of the system, contingent on the prior inputs from the manager. These contingent responses of the system are selected by the operator, obeying further rules which are again secret from the player.

DEVELOPMENT OF THE CONTINGENCY GAME

The development of the game proceeded in three main phases: information package, confidential rules, and manager action spectra. Of necessity, these phases overlapped and interacted with each other, but the ordering indicated is substantially valid.

Pre-Game Information Package

This package contains a building description and game playing instructions. The building description should ideally include all the useful data that might be acquired in actually touring such a building, to provide a realistic, detailed "playing field" for the manager. An extensive task in itself, it was developed cooperatively under Sub-Tasks 1519B and 1519C of this contract. The "development" section of the appropriate final report is abstracted below:

> Existing shelters were examined, and checklists of salient shelter characteristics generated. Working from these, preliminary verbal descriptions of a tour through a hypothetical shelter were written. Judged cumbersome and inadequate by themselves, they were supplemented by drawings made from photographs of selected rooms in real buildings, and by floor plans depicting inter-relationships of rooms. The verbal description was reduced to two supplements: an inventory of all objects in the shelter rooms which could not be identified from the drawings, and a statement of the peacetime functions and operations of the building. This latter includes a description and statistical breakdown of the building personnel and building visitors, plus descriptions of power and utility sources, surrounding environment, and storage of shelter stocks.

Directions for pl: were written as the concept of the game developed, and were added to the building information described above. Together they formed the information package the player was given to prepare him for play. The playing instructions, plus specimens from the shelter description appear in this report in Appendix A-1. The full shelter description may be found in the final report, An experimental study of integrated guidance for shelter management (Smith, Bend, Jeffreys, & Collins, 1966).

Confidential Rules

Rules were needed to govern the presentation of shelter information to players, and some general data on the attack situation at large was needed to write intelligent rules. The information required was a logical extrapolation from data contained in the information package and from an assumption of a relatively low state-of-preparedness, both in the general public and in the manager's building. These rules have some parallel in reality, being taken chiefly from disaster literature (Mack & Baker, 1961).

The extrapolated chain of events adopted as a baseline was as follows: On the advent of the first attack warning, mixed public reaction occurred, the nature of which was unknown to the player of the game. These reactions ranged from immediately seeking shelter to ignoring the warning. The bulk of the population was confused and uncertain, and initially sought further information, either by telephone or by discussion with others. The feeling gradually emerged that they should be in shelter. To most, this meant a basement, and as time went by, there was a steadily increasing drift of building occupants toward the lowest floors in the building. Meanwhile, outsiders came in from the street, attracted by the shelter signs, and began to gather on the main floor. No certainty existed that an attack was really coming, and the people moving toward shelter did so tentatively.

Executives in the building noted the unusual behavior about them and, if the manager had still taken no overt action, one of them contacted the manager to demand information and action.

No radio was immediately available, and with outside telephone lines tied up by other information seekers, the manager was thrown on his own

initiative. He could take action before this time, of course, and effective action could reduce confusion and congestion of the shelter-seekers, as well as avoid the inquiry from the executives.

The second, "take cover" siren sounded 17 minutes after the first warning. The rate of arrivals to the building now reached its highest rate, 400 per minute. With no action on the part of the manager, the main floor, the stairways, and the elevators became increasingly crowded.

This outline of "background" behavior by the public was not available to the player of the game, at least in the form of pre-game information. The information was conveyed to him during the course of the game by reports from his assistants.

Rules concerning delays in communication and travel within the shelter were arbitrarily but realistically set as a function of the shelter building, the crowding, and the confusion outlined above. These rules, again unknown to the player, except where they determined results of his actions and could be inferred, are listed below:

1. For simplicity of the game, travel time on any one floor was ignored.
2. Travel time between floors required one minute by elevator, and thirty seconds per floor by stairway.
3. During the first hour, travel past the main floor required one extra minute.
4. Phone calls to points outside the building were considered to be impossible throughout the duration of the game.
5. Phone calls within the building took one minute to complete.
6. Again, for simplicity, one minute was charged for every communication between the manager and an individual or the shelter group, with the exception of lectures, briefings, etc., which, of course, required longer time.

Management Response Spectra

The rules given above suffice to define the environmental background against which the game was played. They gave no indication of either the decisions the player might reach in his role of manager, or of the responses the system should make to these decisions. As a first step in acquiring this information, an attempt was made to determine the different kinds of decisions managers might make in various shelter situations.

An analysis to determine such management decision spectra was performed on responses to a conventional test for shelter managers. The test used was developed cooperatively under Sub-Tasks 1519B and 1519C of this contract and had been administered to both trained and untrained subjects. It closely paralleled the Contingency Game, since the same environment descriptions were used by both as a starting point and both required decisions regarding various shelter situations. Twenty test papers were selected for detailed study, ten from trained managers with guidance materials, and ten from untrained persons with similar management qualifications.

This analysis resulted chiefly in a heightened appreciation on the part of the researchers for the differences between a test and the Contingency Game. Test response spectra revealed that answers of a "what to do" nature varied little from each other, except for completeness. Very few "wrong" (harmful to the shelter) decisions were noted. Many responses could not be evaluated in terms of their effect on the shelter, however, because they were ambiguous or unclear, or because they involved impossible actions. The latter responses fell into several categories:

1. Subject showed no awareness of the problem of communicating with 6,000 to 10,000 people distributed in many rooms on six floors of an office building; e.g., "I would tell everyone to . . ."
2. Violations of directions; e.g., inventing equipment which was not available in the building.
3. Misunderstandings of either the questions or the information about the shelter initially presented.

4. Insufficient detail in the response to permit action by a subordinate; e.g., "Get everyone organized."

5. Wordy, content-free response; e.g., "Tell them (the shelterees) what they need to know."

6. Unreadable or incomprehensible response.

It will be noted that none of the above categories of responses can occur uncorrected in a contingency game, if the operator has appropriate information cards; i.e., cards by which the shelter system responds to the instruction offered by the manager. Accurately reflecting real subordinate successive cards will continue to indicate a subordinate's confusion until a workable order is given. This compels the manager to correct the shortcomings of his inputs to the system. In essence, the player-manager can no longer "hide behind" a pseudo answer, but is compelled to give a real order or decision whose effect on the shelter may then be estimated.

All intelligible answers to appropriate test items were accepted as managerial actions likely to arise in the game. Their number was totally inadequate to serve as a base for a pilot version of the game however.

The second source of managerial actions was the Shelter Manager's Guic developed as a product of Sub-Task 1533A under this contract. Both recommended and not-recommended actions were extracted from this guidance; i.e., both "correct" and "incorrect" management actions were included in the spectra of management responses.

The aggregate of these was found to be deficient for the purpose of the game. Details of the mechanics for performing general tasks, such as establishing communication with others or detailing instructions to appoint assistants were scanty, and few poor or inefficient decisions were represen

Detailed "action steps" and low quality decisions were generated by logical analysis for those cases where they were likely to be called for by the manager, and tentatively included in the system.

A descriptive card was prepared for each act or decision included in the response spectra on which instructions to the operator were noted, specifying adjustments of shelter time and information cards, if any, to

be presented. The operator's information cards and instruction cards used are listed in Appendix B-1.

The Contingencies

During development of the game, fragments were tested, using members of the Institute staff as subjects. From the results of these tests it became obvious that simulating an entire shelter stay in the depth of detail the game could afford was not possible at the time. Because so many contingencies would be involved, information processing equipment would be required. Further, the game would last approximately as long as the shelter stay simulated.

Instead of the full stay, the period from first warning to bedtime was selected for attention. Within this period fall several important portions of the shelter stay, and the contingencies were developed to cover these portions in special detail. Specific system responses were available for reactions to civil defense warnings, methods of shelter entry and arrival control, and procedures for setting up initial organization. Other system responses were available to appropriately accept a player's questions or directives throughout the evening, although feedback on the effects of such directives was not always available. The contingencies used, i.e., what the system did in response to the actions of the player, can be seen in Appendix B-1.

RESULTS

Pilot Testing of the Game

The exploratory nature of the work made design errors and omissions likely. It was therefore decided to pilot test the approach with subjects other than Institute staff members at the earliest possible time. As soon as sufficient materials were prepared to conduct simulation through to closing the shelter, the first game was scheduled.

Six subjects were selected from both sexes, ranging in age from 19 to 27. All were given one day of intensive shelter management training and given an appointment to play the game. Upon arrival, the subject was given the information package and told he had 45 minutes to study it. After this period, the subject was seated at a table bearing the display panel, and the game proceeded without further verbal exchange between subject and operator.

The general pattern of the subject's actions in the pilot games was as follows:

> Four o'clock: First warning sounds. The manager used public address system to order all building personnel to shelter. Next he called in people from offices in his vicinity and instructed them to go to various strategic points and to direct shelter-seekers appropriately. Guides were seldom assigned to stairwells, nor was the number assigned to the main floor sufficient to deal with the programmed flood of arrivals.
>
> At some point early in the entry phase, the manager generally took time to appoint a few other groups, to take floor management responsibility, to augment shelter stocks, to seek information, or to supplement his earliest and now inadequate guide force. Having appointed no one to count arrivals, he was caught off guard by belated reports of severe crowding in

certain areas. Upon finding his shelter was over capacity, the manager generally ordered discouragement of those still arriving, rather than trying to keep them out. Excesses were diverted to floors not designated as shelters.

Five o'clock: Organized appointments of task teams usually did not take place until the arrival problem was in hand, and when it was attempted, the prevailing confusion made such appointments difficult. In most cases, the manager had no clear-cut idea of how suitable people to lead teams might be found in the building, other than telling some subordinate to find them.

Six o'clock: Once teams were set up, managers took the attitude that "everything is under control" unless they were told differently. When he was notified of a trouble spot, he took corrective action. However, he did not request reports of shelter status which might help him anticipate and avoid difficulties.

Information Obtained from the Pilot Tests

If the number of pilot tests were multiplied, a series of performance criteria could be established, permitting a comparison of the relative worth of alternative strategies. At present, however, the number of pilot tests is too small for a comparison across runs to be very meaningful.

Examining each subject's conduct of his game as a case study does afford some insights to special problems that are a function of the shelter's large size. In spite of the relatively rudimentary state-of-the-game, it has already shown itself to be a practical means of systematically investigating the complex interacting effects of various shelter systems on one another. For example, a player encountered the problem of moving supplies between floors while the main floor was crowded and out of control. The crucial importance of manually-controlled elevators was manifest: Automatic elevators were continuously called to the main floor, blocking the transfer of heavy supplies.

The importance of initiating a shelter population count in the first minutes after warning was shown to vary with shelter size also. In the large building used in the Contingency Game, the manager had no direct perceptions of his population. Therefore, he had no sound basis for a decision to close the shelter (unless he had instituted an arrival tally), before a large unknown number in excess of capacity had already entered.

A means of alleviating the impact of a glut of arrivals also appeared in the pilot tests: A subject sent one team to seal off the basement immediately after the first warning. This enabled him to later "drain off the pressure" when the main floor overcrowded.

The contingency technique, in addition to exposing undesirable interaction effects that are inconspicuous until they arise, has also demonstrated a capacity to elicit solutions that are inconspicuous until they are found. These results can be obtained inexpensively, since only one subject is required in contrast to the six to ten thousand subjects which an occupancy study would require.

The pilot tests also revealed inadequacies and limitations in the game as tested. It was found that the demands on the operator were excessive in terms of speed of reaction and freedom from error required.

- Real-time consumption was high, approximating the passage of shelter-time.

- Insufficient contingencies were available, especially in the area of response to questions from the manager.

- Verisimilitude is reduced by information wording, and by the limited information from outside the building.

- Certain elements which were unspecified in the building description were found to interfere with the player's plans (e.g., is the switchboard manual or automatic?).

Directions for Further Research

Several prospective uses for a Large-Shelter Contingency Game suggest themselves. Prepared as a training aid, it could serve for classroom demonstrations, as a diagnostic or evaluative tool, or as a practical exercise in large-shelter management. Such a device should be useful in management instructor training, as well as in training the managers themselves.

As a research technique, the contingency concept has proven capability to reveal significant problems resulting from obscure interactions of large-shelter variables. Specific applications could include testing the effects of varying large-shelter configurations, evaluating management techniques, testing training procedures, or determining management selection criteria.

The model of the game here reported is an unsophisticated pilot version, simply a test of the worth of the contingency concept. Several of the deficiencies detected from the six games that have been played were noted above. Further work is needed to correct these. Simplifying the operator's task will, of itself, reduce real-time consumption by cutting the response-lag of the system. In addition to rather minor editing known to be needed, quantities of new material have been conceived, but remain untested.

Trial games with subjects should be run concurrently with any introduction of such new material. This will enhance the on-going production, and detect unsatisfactory expansions before they are used as a base for later expansion.

SECTION II

A PILOT STUDY OF ENVIRONMENTAL THREAT

BACKGROUND AND PROBLEM

For the past several years the American Institutes for Research has been conducting a series of shelter occupancy studies designed to identify problems associated with the operation of fallout shelters, and to test potential solutions to these problems. Such studies, conducted in simulated shelters, are constantly confronted with the problem of simulating the stress associated with emergency conditions in order to provide data of maximum usefulness. Shelter occupancy research findings have generally been consistent with the data available from natural disasters and war experiences. Nevertheless, in its recent series of studies, AIR has been striving to more closely achieve the stress associated with certain emergency conditions. The number and severity of problems with which the shelter occupants are confronted is being increased, and the information available to them from outside the shelter is being rigidly controlled.

Simulation of the radiation threat which will surround a shelter, however, is difficult to accomplish within the bounds of reasonable safety. At the same time, the threat of bodily harm quite reasonably may have a substantial impact upon the behavior of fallout shelter occupants during an actual nuclear attack. To the extent that this impact may be different than that of other stress factors, this variable warrants specific attention in behavioral shelter research.

The simulation of physical threat has always been difficult to achieve under safe laboratory conditions. The Institute has been concerned with this issue since the inception of its shelter research. The two primary aspects of the radiological threat in a shelter situation are:

1. Knowledge on the part of the shelterees that the integrity of the shelter is all that stands between them and a hostile enviornment.

2. The perception of premature shelter exit as a threat rather than an escape.

The key to effective threat simulation in shelter research, then, is to enclose the subjects in a facility which they perceive as protecting them from an actual environmental threat. This must be accomplished, of course, without any real danger to the shelter inhabitants. Such a research technique could help to determine what effect the threat of bodily harm might have on the behavior of shelter inhabitants and what steps might be taken to counteract those effects.

The Institute recently acquired access to a basic test facility which appeared well suited for use in studies of environmental threat. This facility consisted of a small "undersea cottage" submerged at a depth of 20 feet within an inland lake.

The shelter occupant with little diving experience may well feel anxious when enclosed in such an environment, even at depths at which no physiological dangers are present. In addition, exit from the submerged shelter without the use of a breathing apparatus, while possible, would not offer a desirable avenue of escape to the shelterees. This condition seems quite analogous to a situation where premature exit from a fallout shelter would pose a hazard to its occupants.

As part of its stress research program, the Institute conducted a small 24-hour pilot study at this test facility. The major purposes of this pilot test were to:

1. Determine the technical feasibility of conducting such studies.

2. Assess the potential impact of environmental threat as a stress factor in shelter habitability.

SHELTER PREPARATION

Basic Facility

The shelter structure itself is an insulated stainless steel tank, roughly 30 feet long by 5 feet wide by 4 feet high. This tank is held at a depth of 20 feet beneath the surface of the water by a steel tower which is anchored in the lake bottom and which extends a few feet above the surface of the water. A platform constructed on the tower just above the water line served as a base of operations for the research staff. A sketch of the research facility is presented in Figure 1.

A preliminary engineering survey revealed that the bouyancy of the air-filled tank was adequately countered by the combined weight of the tower and four concrete anchor blocks suspended by cables from the shelter itself. The tower and tank were both found to be in good condition, with no significant deterioration. Three hatches were present in the bottom of the shelter; one near each end, and one in the middle. The two near the ends were the larger, about two feet across. The hatch at the "forward" end was reserved for routine access, and that at the rear for emergency exit. The center hatch, 18 inches in diameter, was used for utility lines entering the shelter. These floor hatches could be kept open at all times, with the water held out by air pressure, on the principle of a diving bell. A wooden false floor provided a relatively dry, uniform resting surface.

Environmental Problems

The usual problems associated with preparing a habitable research facility were considerably complicated in this study by the need to conduct many of these preparations with a "threatening" environment, i.e. beneath the

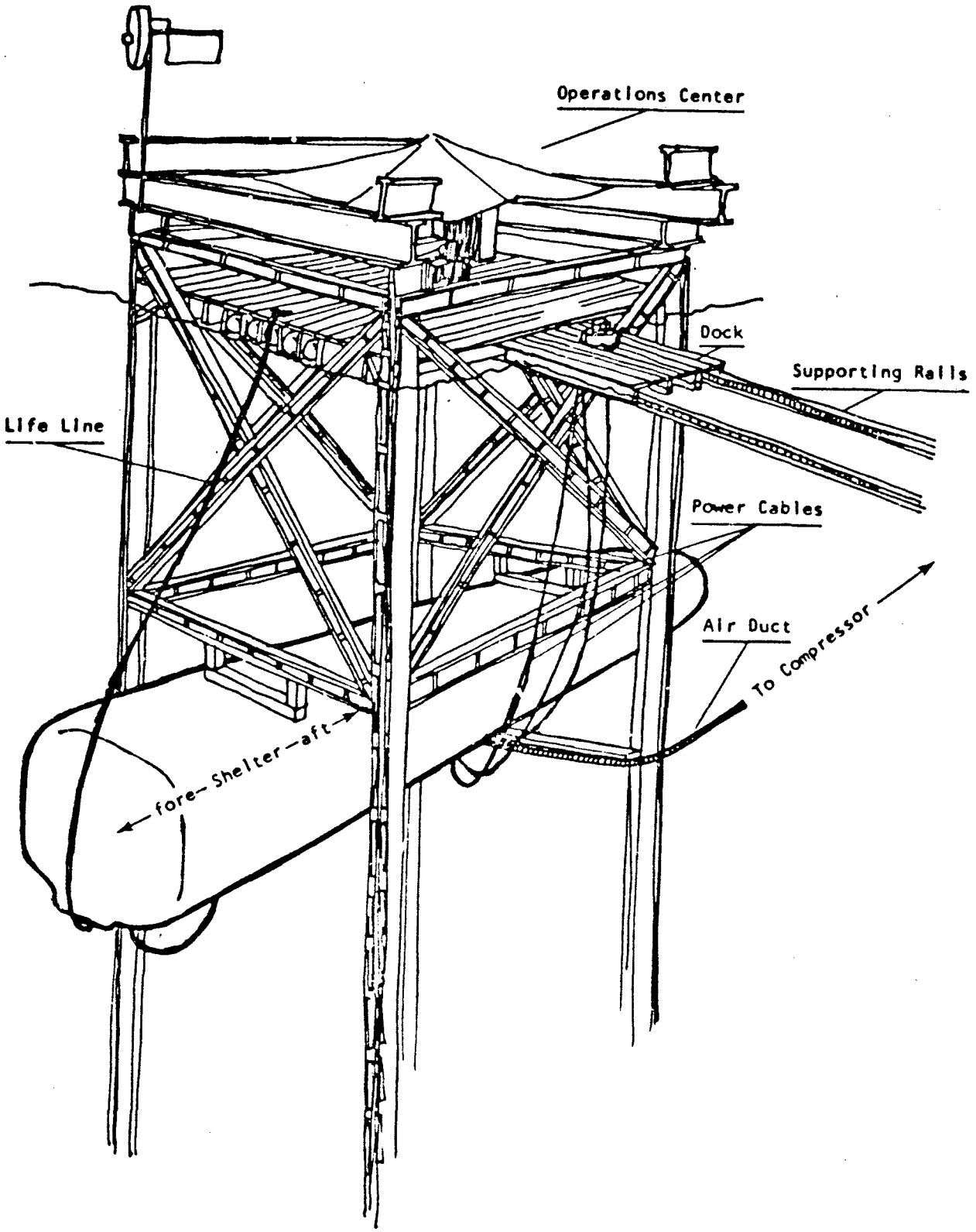

Figure 1. Basic Research Facility

surface of the water. Pursuit of such an operation required the services of well-trained, experienced divers. The Institute is fortunate to have a number of qualified divers on its research staff. Even with the use of experienced divers, however, the simplest of underwater tasks can be complicated by a number of factors, including:

1. Time limitations due to air supply, water temperature, and physical exertion.
2. Limited communications capability.
3. Poor visibility.
4. Lack of leverage.

Even when working within the shelter, self-contained breathing apparatus and portable lights had to be used until more adequate facilities could be installed.

The need for such special considerations when dealing with technical problems was repeatedly demonstrated throughout this pilot study.

Ventilation

Ventilation of the shelter was the major technical problem encountered in conducting this study. There were two reasons for this. First, the pressure differential between the shelter and the surface made provision of an adequate air supply a considerably more complex task than would have been the case for an equivalent land-based shelter. Secondly, shelter ventilation was a paramount factor in assuring the safety of the shelterees, and the requirements for this system were therefore quite stringent. Air trapped in the shelter was pressurized to approximately 1.66 atmospheres (10 p.s.i. gauge pressure). This meant that five c.f.m. of air per person had to be provided from the surface to meet the OCD shelter ventilation requirement of 3 c.f.m./person. An additional problem was that the toxic effects of any air contaminents are increased in a pressurized environment.

Air was provided to the shelter by a Gardner Denver "Cyclo-blower". Technically a blower rather than a piston-type compressor, it did not operate in an oil bath, thereby bypassing the problems of filtering and trapping oil vapor, etc. The required pressure could be maintained for periods in excess of 24 hours with a volume of several hundred cubic feet a minute. For purposes of transportation and positioning at the site, the blower was mounted in the van body of a truck. In operation is was found that this blower tended to overheat when operated slowly enough to supply only the specified 100 c.f.m., and it was found necessary to raise engine speed (and therefore air volume), and control the air flow rate by venting the excess volume.

Air was delivered from the blower at about 14 p.s.i., and at over 200 degrees Fahrenheit. Because of the high temperature, a great deal of heat transfer was required in order to lower the air temperature enough to make the shelter comfortable for the subjects. Additionally, the duct cross section had to be great enough and the interior surface smooth enough to prevent friction from reducing the pressure differential between the blower outlet and the shelter.

Two-inch steel pipe was used to conduct air from the blower to a point approximately six feet from the shelter hatch. The final air connection was made with 4-inch flexible plastic duct. The mouth of this duct was placed at the center hatch a few inches below water level to reduce noise transmitted from the compressor. Exhaust air was vented from the shelter via the rear hatch, which was slightly higher than either of the other openings in the shelter.

Once installed, the ventilation system delivered pure air to the shelter at about 100 c.f.m., for sustained periods of time. Maintenance requirements were minimal. A more detailed disucssion of the installation and check-out of the ventilation system is presented in Appendix A-2.

Other Facilities

General

A cut-away drawing of the shelter appears in Figure 2. The interior of the shelter was divided into two compartments. The larger of the two compartments served as the general living and working area. The smaller compartment, at the rear of the shelter, was used for storage and for sanitation purposes. The partition between the two compartments consisted of an opaque plastic curtain hung on two-by-four framing, six feet forward of the rear wall of the shelter and just forward of the rear hatch.

Low shelving located against the forward wall of the shelter was used for storage of atmospheric monitoring equipment, emergency lights and other small, essential items. The area around this shelving, forward of the front hatch, was used as a shelter management area.

The basic facilities installed in the shelter included lighting, food, water, communications, and sanitation equipment. These facilities are described below, along with a description of the shelter power supply. A discussion of the installation of shelter facilities is presented in Appendix A-2.

Power Supply

Electric power requirements for the shelter as well as topside operations were met by a portable 1,000 watt, 110-volt gasoline-powered alternator. A standby generator was provided, but was not required during the study. The ventilation system operated independent of this power supply.

Lighting

The primary shelter lighting system was a single 75-watt bulb powered by 110 volts provided via a cable encased in common vinyl garden hose sealed at both ends. The bulb was enclosed in a pressure-sealed glass

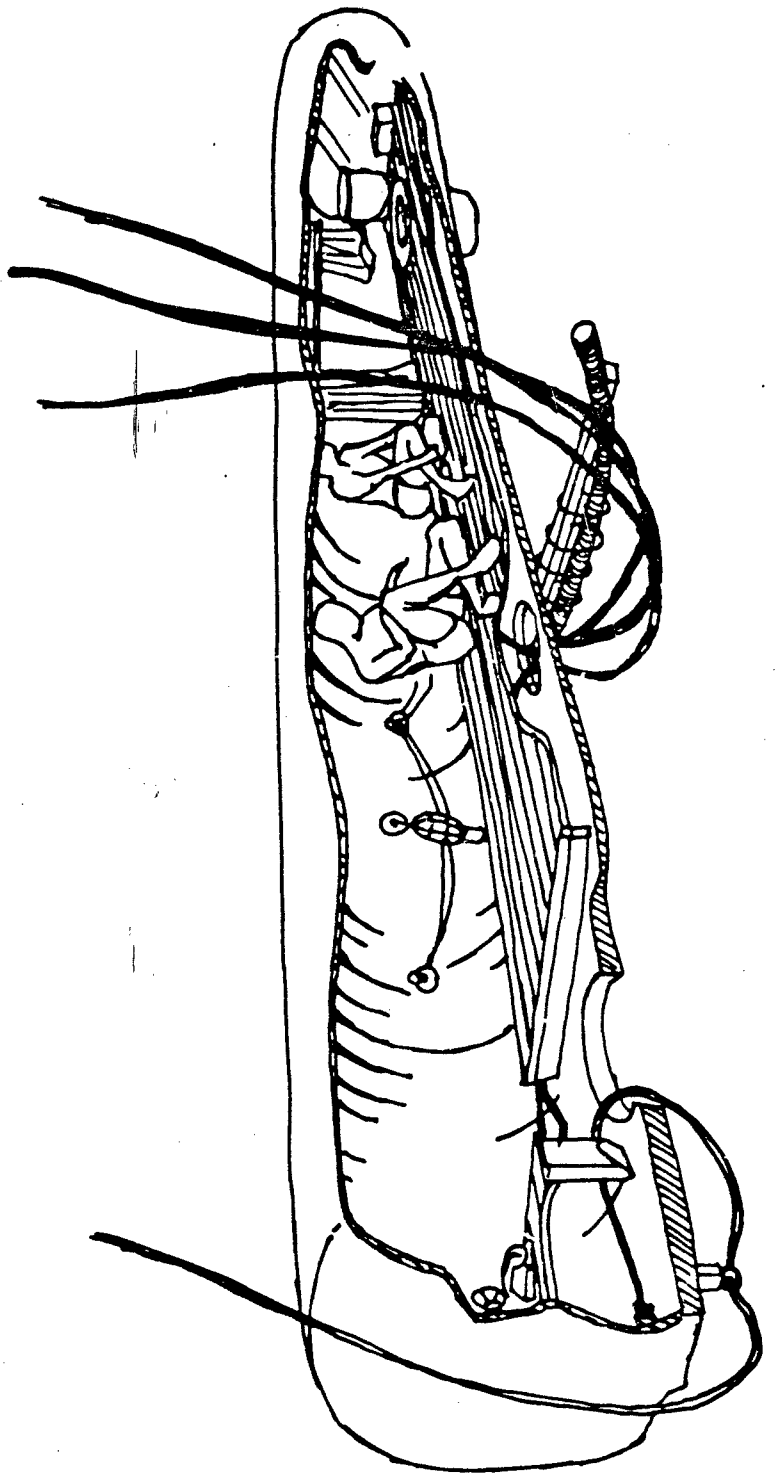

Figure 2. Cut-Away Drawing of Shelter

housing and hung from the wall at a central location in the shelter. The reflection provided by the stainless steel lining of the shelter created a completely adequate level of illumination from this light source.

The secondary lighting system consisted of six 6-volt bulbs wired in parallel and connected to the shelter wall at ten foot intervals by the use of suction cups. This system, which was used for "night-lighting", received its power through 16-gauge, neoprene jacketed cables running from a step-down transformer at the surface. The light provided by this system was adequate for reading.

A six-volt, battery-powered underwater light was kept in the shelter for emergency purposes.

Communications

The primary communication link between the shelter and the operations center was a "Diver-com" system normally employed for "hard-hat" diving operations. The microphone and speaker normally mounted in the diver's helmet were installed in the shelter, and the amplifier and main station located at the operation center. This system permitted surface personnel to continuously monitor shelter activities. The operations center could address the shelter at any time by depressing a switch and speaking into the microphone at the surface. Standard weatherproof 300 ohm television lead-in wire was found adequate for transmitting the signal.

Back-up communication was provided by two phones, one mounted at each end of the shelter. A vinyl jacketed multiconductor cable was run from each phone in the shelter to the surface, where each cable was terminated in a separate phone mounted on the platform. Although both were served by the same power supply, they were otherwise independent. The integral signal buzzer was adequate at the shelter end, but at the surface, it was found necessary to substitute an electric horn to enable a signal from the shelter to be heard.

In an emergency, written messages could be sent to the surface in a bouy via the life line running between the platform and the shelter. The operations center on the tower communicated with the Institute's shore-based installation via portable, citizen-band transceivers.

Sanitation

A standard OCD sanitation kit was installed in the submerged shelter, using a water drum (as opposed to the cardboard drum) as the basic sanitary container. The water drum was suspended through the rear hatch, supported in a framework of 3/4 inch marine plywood 2 feet square and 4-1/2 inches high. This framework and the drum could be quickly lifted from the hatch as a single unit to permit use of the hatch as an emergency exit.

The disinfectant provided with the OCD kit was not used due to possible toxic effects of the fumes under pressure.

Food, Water, and Medical Supplies

The submerged shelter was stocked with the standard OCD food, water, and medical provisions. Some problems were encountered in transporting these stocks to the shelter while keeping them intact and dry. The procedures used for this operation are also discussed in Appendix A-2.

Atmospheric Monitoring Instruments

Instruments for measuring CO_2 and CO were stocked in this shelter in place of radiological monitoring equipment. There was a real need for these instruments in assuring the safety of the shelterees. Further, it was thought desirable to informally compare shelteree use of these instruments to the manner in which radiological monitoring equipment normally is utilized in land-based shelter studies.

SUBJECTS

The subjects for this study were all members of the Institute's staff. All had prior shelter experience and had received at least basic SCUBA diving instruction. The use of experienced staff personnel, as opposed the "naive" subjects, was desirable for this pilot study in order to:

1. Assure the safety of the shelterees.
2. Permit comparison of the psycho-sociological aspects of this test experience with other shelter experiences.
3. Enhance the validity of subjective data through the use of trained observers.

Ten staff members were given special training in routine and emergency escape procedures, including free ascent.* Following this training, 6 persons, 4 males and 2 females, were selected for participation in the test. It was desirable to keep the number of shelterees to a minimum because of the capacity of the test facility and the need for uniquely qualified subjects. A team of six shelterees, in addition to approximating the size of a basic shelter unit (Bend and Shively, 1963), also were large enough to permit the development of traditional group processes.

The test director served as shelter manager. This individual had many hours of shelter experience. He also was a highly qualified diver, and had personally directed the installation of the shelter facilities.

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*A technique used in submarine escape without the use of a breathing apparatus.

GENERAL PROCEDURES

The subjects descended to the shelter with the use of SCUBA. Descent was made along the life line to the forward hatch. Two experienced divers accompanied each subject to the shelter. The shelter manager was the first to enter the shelter, and he checked the condition of each shelteree as they entered.

Only one SCUBA unit was kept in the shelter during the test period. Although the shelterees were trained in free ascent, procedures were developed to permit emergency egress of all shelterees in approximately two minutes with the use of SCUBA. These procedures are outlined in Appendix B-2. The prospect of emergency free ascent was used more as a source of stress to the subjects than as a necessary escape procedure. Due to the location of the management area, it was possible for the shelter manager to physically control egress from the shelter.

The research staff maintained constant auditory surveilance of the shelter. The shelterees monitored the CO and CO_2 levels in the shelter hourly, and maintained communication checks with the surface every half hour on alternate phones.

A squad of six divers kept a service and safety watch on the shelter during the study. These divers were highly experienced, had worked together in the past, and had received special orientation for work on this study. They worked in two-man teams, with each team standing a four hour "alert" every twelve hours. The team on alert conducted periodic checks of the underwater facilities external to the shelter, and stood ready to descend to the shelter within 15 seconds of any request for assistance. All divers not on alert remained in the operations area where they could readily be called upon for assistance. Specific

procedures were developed for dealing with critical contingencies such as a compressor malfunction, shelteree illness, etc. The research team, the divers, and the shelter manager were all familiarized with these procedures which also are outlined in Appendix B-2.

A schedule was developed for in-shelter activities during the study (See Figure 3). This schedule was generally adhered to during the shelter stay, with some notable exceptions which are discussed later in this report under Results of the study.

The shelterees were organized into five teams: Atmospheric Monitoring and Safety; Communications; Medical; Food, Water, and Sanitation; and Recreation and Religion. Each shelteree other than the shelter manager served as a team head and a member of one other team.

The shelterees were removed from the shelter approximately 24 hours after shelter entry. Using SCUBA, each ascended along the life line accompanied by two divers. Immediately upon surfacing, each subject was debriefed by a member of the research staff.

DATA COLLECTION

Each subject was asked two basic questions by a member of the research staff immediately following their ascent from the shelter. These questions were directed at assessing the shelterees' level of anxiety during their shelter stay. They were:

1. What did you feel was the probability that the study would have to be terminated prematurely?
2. Did you feel you were in danger at any time?

   When?

   Explain:

TIME	ACTIVITY
T+0 (11:00 AM)	Shelter manager assumes command
T+1 (11:01 AM)	Initial briefing: Reassurance, Statement of Hazards, Escape Procedures, Atmospheric Monitoring
T+30 (11:30 AM)	Stow gear
T+45 (11:45 AM)	Team assignments
T+1 (12:01 PM)	Team Meetings, Orientation, Initial Activities
T+1:30 (12:30 PM)	Lunch
T+2:00 (1:00 PM)	Free time
T+3:00 (2:00 PM)	Briefing/Discussion: Nature of the shelter system, Escape review, Shelter routine, Schedule for remainder of the day
T+4:30 (3:30 PM)	Water break -- Free time
T+5:30 (4:30 PM)	Team meetings and reports
T+6:00 (5:00 PM)	Supper
T+6:30 (5:30 PM)	Clean up -- Free time
T+7:00 (6:00 PM)	Briefing/Discussion: Medical aspects of survival
T+9:00 (8:00 PM)	Free time -- Recreation
T+10:00 (9:00 PM)	Water break
T+10:30 (9:30 PM)	Set up sleeping and security arrangements
T+11:00 (10:00 PM)	Lights out
T+19:00 (6:00 AM)	Reveille
T+20:00 (7:00 AM)	Sick call
T+20:15 (7:15 AM)	Briefing/Discussion: Problems, Impressions, Review plans for the day, Post-shelter survival, Medical, Public Relations
T+22:00 (9:00 AM)	Water break -- Free time -- Religious service
T+23:00 (10:00 AM)	Clean up, Collect gear
T+23:30 (10:30 AM)	Briefing for shelter exit
T+23:45 (10:45 AM)	Initiate shelter exit

Figure 3 . Shelter Activity Schedule

Each subject also was asked to rate 28 "discomfort" factors on a three point scale, (bothered "little", "some", or "much"). These factors are listed in Figure 4. Any comments concerning the study which were volunteered by the shelterees during their debriefing were noted by the interviewing staff member.

During each communications check with the operations center the shelter manager or communications chief reported the shelter temperature, humidity, CO and CO_2 levels, and any unusual situation or occurrance that may have transpired during the half hour between checks. This information was logged by the research staff member receiving the call from the shelter.

The test director/shelter manager informally interviewed each shelteree at least twice during the shelter stay. During these interviews an attempt was made to detect any anxiety in the subjects and to identify the source of this anxiety. The shelterees comments on their subjective impressions of the shelter stay also were noted during these interviews. Finally, the test director was responsible for general observations of shelteree behavior during the study.

No formal notes were kept by the shelter manager while in the shelter. As mentioned earlier, comments of particular note were passed to the research staff over the phone and recorded by them. Immediately following the shelter stay the test director/shelter manager and the staff member primarily responsible for auditory monitoring of the shelter held a lengthy "mutual debriefing" and recorded their observations on the study.

1. Bunks
2. Behavior of other shelterees
3. Inability to concentrate
4. Lack of exercise
5. Dirt
6. Odors
7. Boredom
8. Crowding
9. Lack of privacy
10. Concern about outside world
11. Lack of water for washing
12. Noise
13. General risk of bodily harm
14. Toilet facilities
15. Condensation
16. Food
17. Temperature
18. Vibrations
19. Humidity
20. Physical symptoms (headaches, constipation, etc.)
21. Possibility of air failure
22. Possibility of communication failure
23. Day lighting
24. Inability to stand erect
25. Possibility of light failure
26. Sleeping difficulty
27. Inadequate leadership

Figure 4. Discomfort Factors

RESULTS

General

There were no significant equipment malfunctions during the 24 hour study. The effective temperature in the shelter remained at about 76 degrees throughout the shelter stay, and both the CO and CO_2 levels were maintained within tolerable limits.

The subjects completed the shelter stay in good physical condition. All of the shelterees reported that they considered their stay in the shelter more stress-inducing than their previous experiences in the regular shelter laboratory.

Certain stressful aspects of the shelter stay were not directly related to environmental threat. Lack of exercise and the inability to stand erect were rated as the most "bothersome" factors associated with the shelter stay. Food was rated by three of the subjects as a "much" bothersome factor. This evaluation of shelter rations was more harsh than had been the case in the subject's previous shelter stays. Subsequent discussions with the shelterees indicated a feeling that they were accepting a considerably more stressful environment than had previously been the case, and wondered why they had to "put up with austere rations in addition to everything else". This reaction is consistent with behavior observed in natural disasters, where those recovering from the initial shock of their experience began to complain about detailed aspects of rescue or recovery efforts (Smith, 1963).

Environmental Threat

Indications of Stress

The subjects in this study also exhibited a number of behaviors indictive of general anxiety with regard to the shelter situation. The initial hours of the shelter stay were characterized by the loud, rapid conversation and the "nervous" laughter which have been reported as an indication of general anxiety in previous shelter studies (Altman et al, 1960). Later in the shelter stay the frequency of this behavior decreased to almost nothing.

Concurrently, the amount of cat-napping by the subjects increased, and the shelterees repeatedly attempted to insert "rest periods" into the shelter schedule. While there was some physical stress associated with the shelter experience, it was not deemed sufficient to exhaust the well-conditioned subjects who participated in this study. Frequent or excessive sleep is a commonly observed response to a threatening environment. Further, sleeping during free-time periods in a 24-hour study is unusual for a group of acquaintances with previously established social patterns. It is interesting to note that this behavior pattern was previously observed in the "dark study" conducted by the Institute in 1965 (Hale et al, 1965). At that time, the subjects' interest in sleep was attributed to the fact that they were confined in total darkness, but the potential stress of that situation also is obvious.

In their interviews both during and following the shelter stay the subjects reported varying degrees of anxiety in connection with perceived threat. Concern for their own safety was reported as minimal when the shelterees were actively engaged in some activity during the daylight hours. Most subjects reported that they forgot where they were at these times and that the background noise and vibration which characterized their environment gave them the feeling that they were "moving", as in a plane or boat.

Almost all of the subjects, however, reported some nervousness when they stood watch alone during the night. At these times they were more acutely aware of the nature of their situation and had more time to think about the possibility of a system failure. The presence of this increased anxiety was evidenced by attempts on the part of some of the subjects to engage in conversation with members of the surface crew via the "Diver-com". Only one subject reported a feeling of "panic" during the shelter stay. This individual felt "panicky for a moment" upon awakening from a nap and becoming temporarily disoriented.

The way in which the subjects responded to the atmospheric monitoring task is important to note with regard to their general attitude, if not their anxiety level during the shelter stay. The job of briefing the shelterees on the use of the atmospheric monitoring equipment was the responsibility of the safety team head, who received his instructions from the shelter manager immediately upon entering the shelter. Shortly thereafter, while the shelter manager was in the rear compartment stowing some personal gear, the safety officer began his briefing on his own initiative. He had the complete attention of every shelteree during the entire briefing. No word was spoken other than an occassional question. Such complete attentiveness on the part of the shelterees is unusual in any shelter briefing, even to such a small group. Throughout the shelter stay atmospheric monitoring, which was substituted for radiological monitoring, was rigorously practiced by every member of the group as their assignment dictated.

Sources of Stress

A number of factors related to the environmental threat were given moderate ratings as discomfort factors by the shelterees. These included, in descending order, vibration, odors, and noise. The more abstract factors, including general risk of bodily harm, possibility of air failure, and possibility of communications failure, received lower ratings. Although

people usually are conservative in rating their own fears, these data indicate that anxiety in this shelter situation was related to specific stimulus factors which served to remind the subjects of the environmental threat. This hypothesis is supported by the fact that subjects who reported they felt they were in danger at some time during the shelter stay referred to a specific stimulus factor (i.e., "vibration" or "fumes") in explaining their concern.

A casual comment by the shelter safety officer regarding apparent deterioration of the physical condition of the shelter since his previous visit* reportedly had a negative impact upon the morale of some of the shelterees. His comment was not meant as an expression of concern, but his wording was unfortunate. The reaction of the subjects was not surprising, but this incident emphasizes the need for consistent expressions of confidence by senior personnel in stressful environments.

The shelter manager reported his "real" responsibility for the shelterees as a major stress factor during his stay in the shelter. He indicated that this concern was unique from his attitude during a shelter stay where no real threat was involved and where the research staff had visual contact with the shelter. As with the other shelterees, the shelter manager's anxiety was greatest when he had an opportunity to respond to the physical cues associated with his environment.

*The safety officer was the only shelteree other than the shelter manager who had seen the shelter prior to the test.

CONCLUSIONS

The conclusions drawn from this exploratory pilot study must necessarily be very tentative, but several findings appear worth noting. They are:

1. It is technologically feasible to conduct a shelter study involving a "real" threat element while at the same time assuring the safety of the shelterees.

2. This environmental threat used in this study seemed to be moderately anxiety-producing even in subjects who were familiar with the threat element and who had previous shelter experience.

3. Anxiety on the part of the shelterees was related to specific stimulus factors associated at least indirectly with the threat element.

4. The shelterees in this study exhibited marked attentiveness to certain procedures (atmospheric monitoring) related to their well-being. This attentiveness appears greater than that exhibited to radiological monitoring tasks in other shelter studies.

5. Responsibility for the "real" protection of the shelterees appears to be more stressful for the shelter manager than his responsibilities in other simulated shelter situations.

Although these conclusions are tentative in nature, it is felt that they should be given serious consideration in shelter research.

SECTION III

HABITABILITY UNDER CONDITIONS OF STRESS

PROLOGUE

Recently, we have been questioned on the use of the term "stress" to describe the shelter studies conducted under this effort (Wright & Hambacher, 1965). The legitimate point has been made that we have not defined what we mean by our use of the term "stress." This matter should be cleared up before we proceed with this report.

"Stress," as we use the term, is a shorthand device to convey the impression to the reader of our attempt to program into our studies a wider range and greater number of realistic shelter problems than either we ourselves or other investigators have used in previous fallout shelter exercises.

We recognize that the term "stress" suggests that we feel that the shelterees respond to these problems in a stressful fashion--either emotionally or physically. It should be stated here that we treat this aspect of the use of the term as a hypothesis, not as an assumption. Such events as late arrivals, simulated injuries, and the presence of an agitator may produce more stress-like reactions on the part of the shelterees than the more common range of problems previously employed, but this must be determined empirically--it cannot be assumed.

Our present efforts have concentrated on attempting to simulate, as realistically as possible, both physically and psychologically, the reasonably expectable environment of a small fallout shelter under actual emergency conditions. It has been assumed that under these conditions, problems would occur that would threaten the integrity of the shelter group--again, both physically and psychologically. Problems of this nature which are amenable to laboratory simulation were selected and used in our current studies.

Whether these simulated aspects of an actual shelter environment were threatening, stressful, or only amusing to the shelter population will be discussed in the body of the report. Our main purpose was to determine what people would do in response to this environment, to identify those aspects of the environment which appear to produce behavior which would be undesirable in the real shelter, and perhaps to learn how such behavior might be modified and controlled in the real shelter.

INTRODUCTION

The primary goals of a behavioral scientist are to describe, understand, predict, and control behavior associated with a particular area. To use slightly different words, the task faced by the benavioral scientist in studying the operations of a fallout shelter is to determine what behaviors are likely to occur in the real shelter, to the degree that he is able, to determine why they occur, and finally, to offer suggestions as to how they may be controlled in such a way that the probability of successful operation of the shelter is increased.

Success in achieving these goals rests greatly upon the research techniques employed. These techniques must be so designed as to yield good and adequate descriptions of the behaviors studied, and must also be designed in such a way as to produce a realistic representation of the predicted and expectable shelter environment. Predictions about what people will do in the real shelter, and recommendations about how to control these behaviors often are based upon observations and descriptions of behavior elicited by shelter exercises where the participants are faced with neither the number nor the range of problems that they would likely face in the "real thing." In addition, some attention should be given to making the total environmental "surround" of the test shelter as realistic as possible to make the situation for the participant something more than being confined in a room for a given period of time.

The present series of four studies was an attempt to investigate the feasibility of making habitability studies more realistic--both in terms of the number and range of problems presented to the shelter group, and in terms of the total physical environment of the shelter itself. The studies were frankly exploratory, but had as their basic purposes:

1. The determination of what the shelterees did in response to the various aspects of the simulated environment.

2. The identification of those aspects of the environment which appear to be successful in increasing the involvment of the participants with the exercise--i.e., those aspects of the simulated environment which appear to produce realistic behavior patterns on the part of the participants.

3. The identification of behavior patterns associated with the simulated environment which appeared to have implications for current Civil Defense policies and/or appeared to be worthy of future research effort.

For convenience, these studies are referred to as "stress studies," and a discussion of the use of this term appears in the Prologue to this section of the report. These four current studies grew out of last year's efforts under the same contract, in which the final three studies of a twelve-study series were devoted to the analysis of the effectiveness of different management styles under conditions of increased problem-loading (Hale, Rosenfeld, & Berkowitz, 1965). Because the current studies are extensions of this work, they are numbered consecutively, i.e., Studies 13, 14, 15, and 16.

METHOD

I. The Laboratory

A description of the shelter laboratory can be found in Appendix A-3. The 20-person configuration was used for all four studies.

II. Subjects

Participation in the studies was elicited through want ads placed in local newspapers. An application was sent to each person who indicated interest in participating. Completed and returned applications were classified in terms of availability, socio-economic level, sex, age, race, and whether the applicant wished to participate alone or as a member of a group of applicants. Upon being classified, potential subjects were tentatively assigned to a shelter stay.

In order to qualifiy for the study a potentia subject was required to attend a psycho-medical examination. An exam was held several days prior to each shelter stay at the University of Pittsburgh's Falk Clinic, and was carried out by project personnel in cooperation with the Clinic's medical staff. The medical consisted of a comprehensive physical check, a urinalysis, hemotology, and a chest X-ray. Enough information was gathered to assure that no medical condition existed which would constitute a health hazard in the shelter.

A rough measure was also taken of each subject's mental health by means of a psychological interview and a personality test. The interview was a brief informal session conducted by a member of the medical staff. It was primarily an attempt to spot any blatant character abnormality or psycho-neurotic condition which might prove to be a danger to the other

shelterees or the individual himself under the stress of shelter life. However, no attempt was made to probe in depth.

The instrument selected for the personality testing was The Institute for Performance and Ability Testing's Sixteen Personality Factor Questionnaire, Form A. The "16 PF" is an easily administered, relatively "painless" test which isolates sixteen distinct, primary personality factors including emotional stability, withdrawal tendency, general ability, and dominance. It was useful in providing personality information in greater depth than was possible with the interview alone, and because of the ease with which it could be scored, it gave a valuable "on-the-spot" evaluation of problem cases.

The pre-shelter section of the pre- and post-shelter tests was administered as part of the medical examination.

A subject found unsatisfactory from a medical or psychological standpoint was excluded from further consideration, and, if the difficulty was of a medical nature, he was notified and a letter sent to his personal physician. The number of potential subjects rejected, however, was not great. Six subjects failed to pass this preliminary screening.

When the results of all tests were known, the subject list for a stay was finalized. Final approval of a subject for participation in any given shelter stay was based on (1) successful completion of the psycho-medical examination, and (2) group composition requirements for that stay. Subjects who obtained final approval were notified by mail and were normally contacted by phone to confirm their participation a day or two before shelter entry.

Each subject who participated in a study received an honorarium of $25.

Two small groups (three to five people) were obtained from the subject pool to serve as late arrivals in each study. Different people were used in each study for these groups. Late arrivals for the second day of the stay, when used, were composed of either AIR personnel, or people from the first evening's late arrival groups who had not been admitted to the shelter.

Pre-entry processing of each study group was kept to a minimum. A cursory medical examination was given by a registered nurse, the equipment brought to the shelter by each participant was inventoried, and they were then admitted to the shelter. With the exception of late-arrival groups, no briefing was given to them about the nature of the study.

The composition of each subject group can be seen in Table I below.

Table I

Composition of Subject Groups Used in the Four Studies

(Data includes late arrivals.)

	Study 13	Study 14	Study 15	Study 16
Mean Age	26.3	28.4	28.3	29.9
Age Range*	14-45	15-50	14-48	14-53
Family Groups	7 (Containing 19 out of 28 shelterees)	7 (Containing 16 out of 27 shelterees)	8 (Containing 17 out of 28 shelterees)	5 (Containing 14 out of 28 shelterees)
Individuals	9	10	11	14
Racial Composition	Approximately 25% Negro	Approximately 25% Negro	Approximately 25% Negro	Approximately 25% Negro

*Children under 12 years of age were not used in these studies.

At the completion of each study, the shelterees were served coffee and doughnuts, given a brief congratulatory address by the project director, given the post-shelter form of the pre- and post-shelter test, then dismissed. (Copies of the pre- and post-shelter tests can be found in Appendix B-3.

III. Observation Techniques

Three observers were on duty at all times during each of the four studies. All three observers kept extensive descriptive logs of what they observed. The chief, or senior, observer was, in addition, responsible for the conduct of the study scenario for his particular watch. Each observation team stood four-hour watches. The project director was on duty for the entire duration of each study, primarily to supervise observers and to assist in the presentation of the study scenarios.

Tape recordings were made of critical in-shelter events, and were used to supplement obtained reports from the observer logs.

IV. Scenario Programs Used in the Studies

The scenario of events presented in each of the studies actually constituted what could be called the independent variables of this program, the dependent variable being how the shelterees responded to these events, both in terms of what they did in the shelter, and their performance on the post-shelter tests. Each of these events, or independent variables will now be described and discussed, together with the method used for presenting them, and differences in the form in which they were presented across the four studies. At the end of this section, summary programs for each study will be presented.

Instructions as to What to Bring to the Shelter

Following the example set by the University of Georgia in the spring of 1965, participants in these studies received no instructions in regard to materials they should or could bring to the shelter. Those who asked this question specifically were told that they could bring "whatever you would bring to a fallout shelter if this were the real thing." Of interest

here was the variety and frequency of items brought to the shelter--a rough index of what people perceived that they would need to bring to a shelter in the event of a nuclear attack. This variable was held constant across all four studies.

"Staggered" Entry

The usual research practice, for AIR at least, has been to give the shelterees a rather extensive pre-entry processing, including a formal briefing, and then to admit them to the shelter "all at once"--i.e., in one body. The artificiality of this procedure is obvious, and it was decided that a more realistic situation could be obtained if the participants were given a minimum of pre-entry processing, and then admitted to the shelter in small groups over an extended period of time. This was done in all of the studies. The time period consisted of one hour in Study 13, and one-half hour in each of the other three studies. (The one-hour period in Study 13 was due only to holding the arrival of the assigned manager and one other shelteree for an extra half hour--see Management Factors on page 50).

Primary-Purpose Configuration

The existence of dual-purpose shelters prompted the question of what people would do if faced with a shelter space which did not look like a typical shelter space--i.e., a vacant or near-vacant room with civil defense supplies apparent. To obtain an answer to this question, the shelter in each study was presented in its "primary" configuration--that being a shabby, but representative, business office. The shelter contained a carpeted floor, two wooden desks, three wooden chairs, a bookcase, two files, a coat rack, a waste basket, and a broom. Research reports (none relevant to civil defense), papers, pencils, and books occupied the files, the bookcase, and the desk drawers and tops. Filled ash trays, two empty pop bottles, and a coffee cup were also distributed in the "office." One desk contained a flashlight, a hammer, and a screwdriver. A radio (see EBS section) was placed on the top of one of the desks.

The configuration of the "office" was identical, down to the placement of the ash trays, across all studies.

Signs leading to the shelter were posted throughout the building, and the standard shelter sign was posted on the wall of the office. In Study 13, the capacity was listed as 20 people. In the remaining three studies, the capacity was not listed due to its effect in Study 13.

The small closet, which in previous studies had contained the sanitation kit, was used to store all of the civil defense supplies and guidance materials. At the start of each of the current four studies, the door on the closet was padlocked and a sign: FOR SHELTER USE ONLY was posted on the door.

Management factors

Management factors, varied across the four studies, consisted of the following five:

1. Emergent versus assigned.
2. Late arrival versus being one of the first to enter the shelter.
3. Whether or not the manager was removed from the shelter.
4. Whether or not the manager, if removed, attempted re-entry to the shelter.
5. Management "style" (see Hale, et al., 1965).

The dimensions of these factors were selected on the basis of our previous work in this area, together with the results of each of the current studies as they were executed. In all but the last study (Study 16) the manager was portrayed by the professional actor who was the manager in our previous twelve studies. (He will be referred to as the actor-manager.)

The planned scenario for each of these factors in each of the studies was as follows:

Study 13. The actor-manager was assigned by an AIR staff member in the presence of one other shelteree at the end of the pre-entry processing. He and the shelteree were admitted to the shelter one hour after the first person had entered. He portrayed a competent, trained manager of the democratic type (similar to our Style 2). He was removed from the shelter during the night, and did not attempt to re-enter the shelter.

Study 14. The actor-manager, one of the first to enter the shelter, emerged as leader in the same way that a shelteree in Study 13 initially emerged as manager. He portrayed an adequate, but not technically skillful manager, and was markedly democratic in making decisions (similar to our Style 2). He was never removed from the shelter. He was, however, instructed to attempt to surrender his position on the grounds of fatigue the following afternoon.

Study 15. The actor-manager was publicly assigned in front of the entire shelter population by an AIR staff member during the pre-entry processing. He portrayed a very competent, technically skillful, task-oriented, and authoritarian management style (similar to our Style 1). He left the shelter with the work-party volunteers the following morning, became "separated" from them, and attempted to gain admittance to the shelter the following afternoon while being held "hostage" by a group of late arrivals. (The reason for this last event will be explained under Volunteers.)

Study 16. The manager was allowed to emerge from the group itself. The actor-manager was instructed to become head of the radiation team, if possible, and to serve as a second agitator in the study, putting additional presure on the emergent leader. In this role, he was to be removed briefly during the dust storm crises the following morning (to test the effectiveness of the rest of the radiation team). The emergent manager was to be left in charge for the duration of the study, and not removed from the shelter.

Agitator Factors

The drama student, employed as an agitator in Study 12 last year (Hale, et al., 1965), was again used as an agitator in all four studies. His task was to do the following:

1. To amplify the feelings expressed by individuals in the study, i.e., to encourage them to make their feelings public and to take action regarding them.
2. To oppose prevailing group opinion about an issue; to present the other side of the issue.
3. To particularly encourage and support attitudes expressed about handling the shelter problems as if the study were the real event.
4. To encourage attention to the problems at hand--to discourage retreat from, or unconcern with, a problem on the grounds that the study is only an "experiment."
5. To encourage and support any ideas or notions about replacing or overthrowing emergent or assigned leadership.
6. Specifically in Study 15, to agitate for the "democratic process" in decision-making at the management level.

The actor-manager was used as a second agitator in Study 16, and had the same set of behavioral "rules" to follow.

Programmed Emergencies

Several types of programmed emergencies--providing the actual technical and non-technical problems for the shelterees--were used in each study. Sound effects, phone messages, and EBS messages were often used to enhance the impact of these problems, and a complete list of these can be found in Appendix C-3. Each of these emergencies will now be described, along with the rationale for them, and differences between studies in their presentation.

1. Late Arrivals. This problem was used because it involves both technical and ethical considerations in reaching a decision as to whether or not to admit such people. Two "primary" groups were used on the first evening of each of the four studies. Two "secondary" groups were used on the following afternoon in Study 15, and one "secondary" group was used the following afternoon in Study 16. Primary groups were composed of experimental subjects, who were instructed that, short of breaking down the shelter door, they were to use every argument and reason they could think of to gain admittance to the shelter. It was explained to them that if the study were the real event, their lives might well depend upon gaining entrance to the shelter.

Secondary groups were composed either of those who had not been admitted the night before, or of AIR staff members. The latter were used in any secondary late-arrival case where a "hostage" was being held.

The groups used in the studies were as follows:

Study 13. Two primary groups, one at 9:30 PM, one at 12:00 midnight, on the first evening.

Study 14. Two primary groups, one at 9:30 PM, one at 12:00 midnight, on the first evening; one secondary group late the following afternoon, holding a "missing" volunteer and RADEF gear as hostages.

Study 15. Two primary groups, one at 9:30 PM, one at 12:00 midnight, on the first evening; one secondary group at 1:00 PM the following afternoon, one secondary group at 3:00 PM, holding the actor-manager and RADEF gear as hostages.

Study 16. Two primary groups, one at 9:30 PM, one at 12:00 midnight, on the first evening; one secondary group at 1:00 PM the following afternoon (no hostages).

EBS message #10, presented at 11:30 PM on the first evening, was used to further enhance the question of late arrivals.

2. Looter Threat. This problem was used to test the ability of the shelter to organize against a possible external threat and also, indirectly, to test the degree of involvement of the people with the exercise.

In Study 13, the looter threat consisted of EBS #12, presented at 2:00 AM the first morning. On the basis of the reaction seen, it was decided to expand the problem over a longer period of time. In Studies 14-16, the problem was enhanced by two sound effects (gunfire at 11:15 PM, and a metallic clanking at 1:45 AM) and a looter "attack" at 6:00 AM by AIR staff members. The attack consisted of three staff members running about and "ransacking" the floor beneath the shelter in Study 14. In Studies 15 and 16, the attack was simply rolling a metal drum full of broken glass and assorted nails and bolts along the floor outside the shelter.

One additional variation was tried in Study 16. As the people prepared to exit the shelter late in the afternoon of the second day, the looter-associated sound effects were played again.

3. "Dust Storm" Crisis. The "dust storm" crisis, presented between 10:00 AM and 10:30 AM of the first morning in the shelter, served as an exercise for the medical, radiation, safety, and sanitation teams. The "crisis" proceeded as follows: first, 5 to 6 volunteers were removed from the shelter at 8:00 AM in accordance with EBS #14. At 10:00 AM, EBS #15 warned them of a severe storm approaching the area (see Appendix C-3). At approximately 10:30 AM, the shelter lights were dimmed, simulated "fallout" (expanded mica) was blown into the shelter through the air ducts, and the volunteers appeared at the shelter, three having severe "wounds," and all liberally dusted with the mica. The wounds portrayed were: (1) a severe cut on the temporal portion of the forehead, (2) a long, bruised gash on the ulnar aspect of the forearm, and (3) severe lacerations on the back of both hands. The injuries had been produced by the use of stage make up.

The storm preceeded slightly the returning volunteers in Studies 14-16, in order to better determine the impact of each alone. In Study 13, a woman displayed momentary, but intense, alarm when she thought her son

was not among the returning volunteers. This episode led to the decision in Study 14 and Study 15 to "snatch" one of the volunteers, and to have both one volunteer and the radiation gear missing from the returning volunteers. The use of this volunteer and the RADEF gear as hostages by secondary late arrivals in Studies 14 and 15 was done purely out of curiosity.

In all situations, the volunteers were rehearsed with plausible stories as to what they had done outside the shelter, how they had become injured, and how they had "lost" a member of their team and the RADEF gear.

4. Power Failures. "Power failures" (blackout of both day and night lights in the shelter) were used in each study as follows: Study 13 had one early on the first afternoon. Studies 14-16 had one at 4:00 AM, and one following the sound effect of an explosion at 9:00 AM the following morning. The one at 4:00 AM was given to encourage its association with looters. All of these were held from 15 minutes to one-half hour.

5. Fire Threat. Because of the lack of problem-directed activity on the first afternoon in Study 13, the fire threat was added to each of the following studies. The fire threat was begun with a sound effect (loud explosion) at 12:00 noon, accompanied by turning off the air conditioner. Over the next two and one-half hours, three phone messages (see Appendix C-3), plus the rising temperature in the shelter served as indication to the shelterees that evacuation preparations should be made.

6. Civil Defense Stocks Missing. To test the alertness of the medical teams, the medical kit used in each study had all the drugs missing. In addition, all groups had less than the recommended amount of food and water for a two-weeks' stay.

7. EBS System. The EBS system employed presented in itself a technical problem to the group. A tape recorder was wired into the radio in the shelter, and in order to receive EBS messages, the group had to turn on the radio, tune it to the correct frequency, and maintain it on the correct frequency. This frequency was marked on the tuning dial. Needless to say, standard radio broadcasting could not be received through this radio.

8. Exit Problem. The exit problem (or Munhall problem) was presented to each group to investigate the effects of leaving the shelter upon the problem-solving ability of the group and their cooperation with the leader, as well as their involvement with the study. The question of what happens to existing group organization upon departure from the shelter is an important issue, and this was a first attempt at investigating this phenomenon.

The Munhall problem was presented to the shelter group by a phone call to the manager at approximately 4:00 PM on the first afternoon of each study. The content of this phone call can be seen in Appendix C-3.

The problem itself commanded considerable logistic planning in terms of division of supplies and people among the available vehicles, as well as planning an evacuation route. To most Pittsburghers, there is one obvious way to get from the location of the study to the Munhall area--and that is over the Homestead High Level Bridge. Several other routes are possible--all of which involve bridges, tunnels, or both. An interest here was to see if questions about these other bridges and tunnels were asked.

The project director met the people outside of the shelter building, supervised the task, and raised questions where appropriate. The appearance of a staff member was necessary here, but was also done to see if identification would be requested.

Summary Programs for the Studies

Table II on the following pages presents a summary of the scenario events used in each of the studies.

Table 11

Summary Programs for Studies

Event	Study 13 30-31 July 1965	Study 14 6-7 Aug. 1965	Study 15 13-14 Aug. 1965	Study 16 20-21 Aug. 1965
1. Staggered Entry	Yes	Yes	Yes	Yes
2. Primary-Purpose Configuration	Yes	Yes	Yes	Yes
3. Management Factors:				
a. Actor-manager used	a. as manager	a. as manager	a. as manager	a. as second agitator
b. Manager assigned or emerged	b. assigned	b. emerged	b. assigned	b. emerged*
c. Manager's arrival	c. one hour after first person entered	c. one of first people to enter	c. one of first people to enter	c. one of first people to enter*
d. Manager removed from shelter	d. at 4:00 AM on the 31st	d. no	d. at 9:00 AM on the 14th	d. at 1:00 PM on the 21st*
e. Manager attempted re-entry	e. no	e. ---	e. at 3:00 PM on the 14th (as a hostage)	e. no*
f. Management style	f. Style 2	f. Style 2	f. Style 1	f. Style 1*
4. Agitator Factors	see text	see text	see text	see text--2 used
5. Programed Emergencies:				
a. Late arrivals	a. 9:30 PM on 30th, 12:00 midnight on 30th	a. 9:30 PM on 6th, 12:00 midnight on 6th, 3:00 PM on 7th with a hostage	a. 9:30 PM on 13th, 12:00 midnight on 13th, 1:00 PM on 14th, 3:00 PM on 14th with a hostage	a. 9:30 on 20th, 12:00 midnight on 20th, 1:00 PM on 21st, no hostage

Table 11 (continued)

Summary Programs for Studies

Event	Study 13 30-31 July 1965	Study 14 6-7 Aug. 1965	Study 15 13-14 Aug. 1965	Study 16 20-21 Aug. 1965
b. Looter threat	Yes	Yes	Yes	Yes
--with sound effects and 6:00 AM "attack"	No	Yes	Yes	Yes
c. Dust storm	Yes	Yes	Yes	Yes
--with "missing" volunteer	No	Yes	Yes	No
d. Power failure	d. one at 1:00 PM on the 31st	d. one at 4:00 AM on the 7th, one at 9:00 AM on the 7th	d. one at 4:00 AM on the 14th, one at 9:00 AM on the 14th	d. one at 4:00 AM on the 21st, one at 9:00 AM on the 21st
e. Fire threat	No	Yes	Yes	Yes
f. Exit problem	Yes	Yes	Yes	Yes

*Characteristics of person who did emerge as manager.

RESULTS

I. Synopsis of Each Study

Study 13

The staggered entry period of one hour was marked by several significant events. First, individual behavior was generally that of the typical shelter entry. Shelterees explored their new environment, took great delight in spotting those places where they believed "cameras" and "microphones" were hidden, and eventually settled down in a vacant spot and began to lay out their belongings. Exceptions to the typical entry behavior occurred, however, in that concern was voiced over how many more people were going to come in, and there was a general disbelief evidenced that this "office" was indeed the actual shelter. In spite of the fact that the room was becoming crowded, no attempts were made to move or in any way rearrange the furniture that was present.

During this period, Mr. Grace, a 45-year old insurance adjuster, began to make himself known to the other shelterees, and due to an indicated, but spotty, knowledge of civil defense, questions as to "what are we supposed to do" began to be addressed to him. The suggestion was made to him that the closet containing supplies be forced open. Initially, he decided that all actions should wait for further instructions from the outside, but as the hour wore on, he changed this opinion. When a search for a key to the closet failed, he agreed that the closet should be forced open, told the shelterees that part of the test was probably to see what they would do "on their own," and that it was time to get organized. The shelterees suggested that a leader was needed, and it was quite obvious that they were pointing the finger at Mr. Grace. Mr. Grace suggested that a vote be taken between himself and the next oldest man in the shelter. This man, busily reading a newspaper, declined, and thus Mr. Grace became the appointed leader of the shelter.

Mr. Grace wasted no time in organizing the shelter. The shelter was closed, the supplies and guidance materials were removed from the closet, some of the furniture was moved to make more usable space, and teams and team heads for food and water and first aid were appointed.

Mr. Grace's approach to management was effective, but not direct. Every opinion and introduction he gave was prefaced with, "I don't know, but I think that . . .," or "I may be wrong, but I think that . . .," and the opinions and advice of the other shelterees were solicited for every decision. This "humility" of Mr. Grace was irresistible--the shelterees rallied to his support with alacrity.

The last arrivals to the shelter, encountering a closed shelter door, were the actor-manager and a 23-year old engineer, Mr. Tech. They knocked on the door, and one of the shelterees (not the agitator) cried, "Don't let them in!" This suggestion was ignored by Mr. Grace, who let them in, only to be faced with the actor-manager's announcement that he had been asked to act as manager by the AIR staff. (He had been, of course, and Mr. Tech corroborated this story.) Mr. Grace was somewhat taken aback, and expressed some reservations about rescinding his position. The group supported him. The actor-manager explained that the assignment had been made on the basis of his having had a shelter manager's training course in Iowa some years ago. Again, Mr. Tech supported this story. Mr. Grace announced that he would defer in view of the fact that the actor-manager had been assigned by AIR, but the group again rose to his support, suggested co-managership, a vote, and other alternatives. The actor-manager stated that he was quite embarassed by this whole affair, then switched the subject to registration--had Mr. Grace registered the people in the shelter? Mr. Grace had not, and a discussion ensued between him and the actor-manager as to how to best do this.

It is significant to note that at no time in the study was this issue ever fully settled. The actor-manager did take over the management functions, and, in effect, made Mr. Grace a deputy. However, in an ensuing argument over late arrivals, the actor-manager said, "Look, I'm the manager of this shelter!" --To which the group replied, "No, you're not!"

The agitator, one of the first people to enter the shelter, had remained in the background up to this point. He joined with the group in their contention that they were doing all right and did not need an assigned manager. His next major move came after Mr. Tech, because of his engineering experience, was made head of radiation and safety. Mr. Tech expressed some concern over the ventilation of the shelter, and wondered if they should refrain from smoking. The agitator brought this suggestion to the floor, said that he was in favor of it, and met strong resistance from the smokers in the shelter. It might be good for safety, but it would be "psychologically" bad, they argued. The agitator, a smoker himself, said that he would be willing to do without for the good of the group, and did cease to smoke for the duration of the study. The other smokers thought this to be "pushing," and a rather violent argument resulted. The smokers eventually agreed to "ration" themselves, but they did this reluctantly--embarassed and somewhat humiliated by the agitator's example. This continued to be a sore spot in this particular group which the agitator massaged from time to time--that is, the reluctance of individuals to forego certain comforts for the good of the group as a whole.

After the completion of the first shelter meal, the question of late arrivals emerged as a part of Mr. Tech's briefing to the group on radiological decontamination. It had become apparent that their food supply was limited, and that rationing would be necessary if a two-week stay were involved. Also, the capacity of their shelter at 20 people was noted on the shelter sign on the wall. For this reason, the majority decided that late arrivals should be turned away.

This discussion escalated into a violent argument, particularly with the appearance of a group of late arrivals pleading for admission to the shelter. The actor-manager and Mr. Tech favored admitting late arrivals, and gave some rather sound technological reasons why this would not be dangerous to the group. The agitator and a handful of other shelterees opposed the admission of late arrivals on the basis of lack of food and the fact that they had already exceeded the stated capacity of their shelter. Mr. Grace, obviously discomforted at this often personal and abusive argument, kept trying to bring the issue to a vote.

During the next half-hour, the scene was one of pandemonium. The actor-manager argued the moral issue--one could not let those people die. The antagonists stood pat on the lack of food and the authority of the capacity sign. Mr. Tech vehemently argued that a re-rationing of food sufficient to cover the late arrivals would be totally feasible. He was promptly accused of being an agitator--in league with AIR. Mr. Grace finally brought the issue to a vote, mistakenly counted those against admitting as those in favor of admitting, and started for the door. The agitator pointed out the mistake, and the argument flared again. Finally, a second vote was taken, counted correctly, the actor-manager conceded, and told the late arrivals to go away. They persisted in their efforts to gain admission for a few minutes, then were removed.

Mr. Tech was very bitter about the matter and continued to contest the decision. He accused the group of being totally selfish and brutal, and said that he would expect that anyone there would "stab me in the back for a bit of extra food." A shelteree pointed out that he and the actor-manager actually had been late arrivals, and the group would have been better off if they had kept them out. This comment produced widespread glee on the part of the antagonists.

There is no doubt that this experience left the shelterees in a shaken state. All subsequent events were anticlimactic. Within the first three hours, the battle lines had been drawn. Mr. Tech, in spite of his technical knowledge, was "bad." The agitator, in spite of supporting the majority here, was "bad" due to the earlier smoking discussion. The actor-manager was "bad." Mr. Grace, in spite of almost letting in the late arrivals, was still "good." This relationship of these individuals to the rest of the group remained the same throughout the rest of the study.

Some attempts were then made at recreation (singing), but these were discarded in favor of arranging the shelter for the night. Furniture was again rearranged, and, because of crowded conditions, a 50-50 sleeping arrangement was initiated. Half the shelterees lay down full length, while the other half sat up. Lights out occurred at 11:00 PM.

At 11:30 PM, an EBS message (#10) requested information on the number of additional people the shelter could accommodate. A discussion was held by the actor-manager. Tempers had cooled from the previous discussion, but the prevailing opinion was that no additional people should be admitted. The discussion again escalated into an argument with the arrival of a group of late comers. Again the decision was a firm NO, in spite of all efforts by the actor-manager and Mr. Tech. The argument this time did not involve as many people as it had done before.

The remaining shelter events will now be summarized in order of their occurrence. The looter threat (EBS #12) was presented at 2:00 AM. The actor-manager instructed Mr. Tech to set up a defense against possible looting. Mr. Tech felt that a few guards at the door would be sufficient. The agitator criticized this solution as being too superficial. More people gradually became involved in the solution to the problem. Mr. Tech became angry and threatened to quit the job. The actor-manager soothed his feelings, and the eventual solution was (1) guard teams armed with whatever weapons could be found in the shelter (2) a barricade constructed of desks, chairs, and pieces of a coat rack, and (3) a demonstration of hand-to-hand fighting techniques to the shelterees by Mr. Tech. The development and implementation of the solution to the looter problem took one and one-half hours.

The removal of the actor-manager at 4:00 AM occasioned no great excitement. Mr. Grace was named as acting manager by the departing manager. There was some annoyance at having to remove the barricade to let him out of the shelter.

An observer noted that on the following morning, people exhibited a "good deal of fence-mending," and stated pleasure and pride at "having made it so far." Volunteers were obtained and removed from the shelter with no incident. The group as a whole relaxed from the tensions exhibited during the night and the previous evening.

The "dust storm" crisis and the return of the injured volunteers resulted in nothing noteworthy. The radiation kit was still in the

shelter, so there was no question that neither the dust nor the volunteers were "contaminated." Mr. Grace directed the treatment of the wounded and the sweeping out of the shelter. The job was not done very well, and the agitator attempted to raise concern over this fact, but to no avail. One woman displayed marked, but temporary concern when she thought that her young son was missing from the volunteer group. This event prompted the "snatching" of volunteers in Studies 14 and 15.

The blackout period after lunch created little impact, since Mr. Tech immediately made a usable light source from the dosimeter charger.

All during this time, both the agitator and Mr. Tech were constantly being sniped at by other members of the group. Both kept trying to get individuals to do things for the good of the group, such as refrain from smoking, make a pool of candy and gum that individuals had brought in, and ration it to all members of the group. Responses of individuals ranged from whining to verbal abuse of the agitator and Mr. Tech. A teenager pointedly challenged the agitator to a fight. Mr. Grace continuously tried to smooth over the situation.

It is interesting to note that the suggestions of both Mr. Tech and the agitator were sound and logical. Furthermore, the agitator did set the example on what he asked of individuals, as in the case of smoking.

The emergence problem resulted in some interesting events. The phone message was given at 3:00 PM by the senior observer on duty at the time, and Mr. Grace somehow got the impression that they were <u>really</u> supposed to evacuate the shelter to the Munhall area. His announcement of this was met by total disbelief. A team of two men was sent out of the shelter with the radiation gear. They returned to the shelter to report that the area outside of the building was empty of people (as it indeed was) and that no radiation was present.

Mr. Tech and Mr. Grace conferred for some time, then decided that it would be best to stay in the shelter, and not to evacuate to Munhall. A second phone call from the senior observer straightened out the matter. The instructions were expanded to indicate that their problem was to <u>prepare</u> for an evacuation to the Munhall area. This was understood and accepted by Mr. Grace, and he began to direct efforts toward handling this task.

It is interesting to note that several of the shelterees took an attitude of "the study is over" when the first evacuation message came in at 3:00 PM. They demonstrated no concern for the problem at hand. Indeed, they persisted in hampering observation by trying to see through the one-way mirrors. Except at the beginning of the study, this behavior was not seen again until this time.

Mr. Grace brought out the people and the supplies into the parking lot. He needed constant prompting from the AIR representative to keep his mind on the problem which was to load the available automobiles with people and equipment as it would be done if they were really going to evacuate to Munhall. The planned route was acceptable; Mr. Tech monitored the autos with his radiation gear and found them to be "clean." A man with a severe head "wound" was assigned to be one of the drivers. A boy with a severe arm "laceration" was assigned the task of sitting on the hood of the lead auto with the radiation gear. He was to report any "hot spots" they encountered while on route. When the people and the supplies were in the appropriate autos, the study was terminated. One hour and twelve minutes had elapsed from the time of the first evacuation message.

Study 14

The staggered entry period of one-half hour evidenced typical entry behavior on the part of the shelterees. Exploring, trying to find "microphones" and "cameras," and finally settling in one spot were typical individual behavior patterns. As in Study 13, no attempt was made to rearrange or dispose of the furniture in the room, despite the obvious crowding.

The actor-manager, one of the first people to enter the shelter, used this time to begin his emergence to leadership. His technique was similar to that of Mr. Grace of Study 13, in that he became acquainted with the people, and began to give the impression that he had some knowledge about civil defense. He inquired of people if they thought that the locked closet should be forced open. A shelteree stated that if the study were the "real thing," they probably would do just that. Following this suggestion, the actor-manager forced open the closet door, removed the supplies, directed that the shelter door be closed, and began to set up the sanitation kit. At 7:25, a shelter vote established him as the manager of the shelter.

To this point, the sound effects (sirens) were noticed by the shelterees, but no particular comment was made about them. Also, in contrast to Study 13, the first four EBS messages were not received by this group--several shelterees tried to raise something on the radio, but these efforts were extended at times when no messages were being transmitted. They finally succeeded in getting EBS message #5 at 8:30 PM.

The actor-manager organized the shelter in accordance with the in-shelter guidance. A full complement of task teams and living units were established. Team heads were appointed on the basis of information obtained from the registration cards the manager had them fill out in the shelter. Some rearrangement of furniture took place. Supply inventories were made, briefings of team and unit heads occurred, and a shelter meal was held at 9:30 PM.

Two late arrivals appeared at 9:35 PM, and were admitted with little discussion, but only after the head of the radiation team had checked them for contamination. They were given a meal. Twenty-five people were now in the shelter.

A brief discussion was held regarding what to do about possible additional late arrivals, but no decision was reached. (It was interesting to observe that a strong proponent of not admitting any more people was one of the two late arrivals.)

The phone instructions to plan for a two-week stay, received by the manager at 10:45 emphasized the importance of the late-arrival issue. It must be recognized that this was done through the actor-manager, however. Upon receiving this information, he displayed considerable concern over the fact that they had already eaten "three days' worth" of food. He called for a second inventory of all supplies in light of this news.

An argument did generate over the late-arrival problem, but had neither the severity nor the duration of the one in Study 13. Again, no final decision was made.

The sound effect of the gunshots, (played at 11:15) resulted in one of the shelterees, Mr. Knight, rushing to the shelter door with an improvised club. Mr. Knight was a Nike missile technician, and, as it became apparent, was very concerned about protection and security. He quickly produced a pocket knife of immense proportions, a tear-gas pen, and collaborated with the agitator in constructing a small barricade at the door.

Another discussion began about late arrivals, in which the agitator became more prominent--arguing first one side of the issue and then the other. The relevant EBS message (#10) was not received (someone had turned the radio off station), and a phone call containing this information was sent into the shelter. The consensus of opinion seemed to be that no additional people could be admitted, but no final decision was reached.

The second group of late arrivals appeared at 12:05 AM. Discussion about whether or not to admit them was abruptly terminated by a woman who recognized that her husband was one of the people attempting to gain entry. This settled the issue--the only question was whether or not they could bring their "stuff" into the shelter with them. The agitator suggested that they might have something that would be useful to the group, and a vote supported his notion. The late arrivals were admitted, making a total of 27 people in the shelter.

The actor-manager called out to report that the group had voted that, at most, two more people could be admitted to the shelter.

An additional hour was then spent discussing the merits and demerits of having a fire drill. A plan for shelter evacuation, in the event of a fire, was decided upon. The shelter was very crowded, so at the insistence of Mr. Knight, the late arrivals surrendered some of their bulkier equipment (sleeping bags, etc.) and this was tossed out of the shelter. Mr. Knight was also in favor of discarding some of the furniture (which by this time had been piled in a corner), but this was not done.

Sleeping arrangements were finally discussed at 1:00 AM. The manager criticized the head of safety for not having a plan. The man, a retired security guard, did not appear to be perturbed by this criticism. The shelter finally settled down with considerable difficulty due to the crowding.

EBS #11 was not received--the shelterees were apparently unaware that the radio had been turned off the appropriate frequency. The sound effect (metallic clanking) at 1:45 produced no noticeable response.

The looter message (EBS #12) was not received, so this information was phoned into the shelter. The problem was handled in a fashion similar to Study 13. Weapons were gathered, guards were posted, and a barricade was made at the shelter door. The head of the safety team was again attacked by the manager as being incompetent, and he resigned his post.

At 3:00 AM, four people requested permission to leave the study. One of these was a man with a kidney ailment who left his medication at home. The other three defectors were a family (mother, daughter, and son) who complained about the heat in the shelter. The mother also volunteered that she thought the manager was taking things "too seriously." (She had been head of the food and water team, and had resented having to make a second inventory).

At 4:00 AM, the first blackout occurred. (Night lights turned off.) The manager suggested that this might have been the work of looters, and that preparations were in order. Four of the shelterees took an interest in the problem. The remaining shelterees either attempted to sleep, or manifested a tremendous interest in the fact that the light on in one of the observer panels was visible through the one-way mirrors. At 4:30, the night lights were turned on again with little noticeable response from the shelterees.

Between 4:30 and 6:00 AM, the manager had trouble keeping some teenagers quiet.

At 6:00 AM, the looter "attack" was implemented. (A commotion was created by members of the AIR staff on the floor beneath the shelter.) People were awakened, three male shelterees rushed to the door. This small flurry of excitement soon died out, and the shelter returned to trying to rest.

At 7:00 AM, one shelteree announced that it was time to get up, and turned on the shelter lights. Frivolity and joking began and increased as people awakened. (Similar to morning of Study 13). One shelteree claimed that the walls had been moved in during the night--"six inches on each side." He also said that "they tried to give us too much last night."

The EBS message requesting volunteers was received and six volunteers were removed from the shelter at 9:00 AM. The head of radiation (Mr. Knight) was one of the volunteers, and brought out the RADEF meter with him. (He was instructed to do so over the phone.)

The rest of the morning was spent with recreation, developing rules and precautions against fire in the shelter, a lecture on radiation, and a lecture on first aid. The manager appointed a new head of safety, Mr. Quest, an office manager in his early twenties.

The sound effect of the explosion, followed by the second blackout at 9:30 AM seemed to produce little effect.

The dust storm preceded slightly the return of the volunteers in this study. The dust that was blown into the shelter was rapidly collected and shoved out under the shelter door. There was some concern expressed over the fact that the radiation gear was out with the volunteers.

At 10:50 AM, the volunteers returned, and met with some reluctance at being let back into the shelter. When asked if they had the RADEF gear with them, they lied and said that they did. They were admitted on this basis, one by one, and "decontaminated" in the shelter toilet area.

When it became obvious to the shelterees that one volunteer was missing, and that the radiation gear was not in their possession, a rather violent argument developed. The volunteers admitted that they had lied about having the RADEF gear in their possession, and claimed that anyone in their place would have done the same thing. The shelterees (led by the agitator) argued that the volunteers had endangered the rest of the shelter group, and had been inexcusably selfish. The argument lasted for over an hour. Finally, a major vote favored allowing the volunteers to remain in the shelter.

The fire threat of the afternoon caused the gradual development of preparations for emergency evacuation of the shelter. An interesting innovation was the soaking of the numbered pinnies in water for use as smoke masks in case of the fire spreading to their shelter. Mr. Quest, the new safety head, was very active at this time.

The evacuation preparations began to slow down, of course, since no phone message was received telling them that the fire necessitated their actually leaving the shelter. There was some grumbling and feeling expressed that they had "wasted time" making these preparations.

At 3:30 PM, the third group of late arrivals (AIR staff members) appeared, holding the missing volunteer hostage, together with the RADEF gear. The actor-manager pleaded fatigue, much to the disgust of a few people, and Mr. Quest was put in charge of this problem. The volunteer substantiated his presence by his voice, and by describing particulars of the RADEF gear to Mr. Quest and Mr. Knight. (Mr. Knight, one of the original volunteers, had a severe head "wound"--he was, however, very active in this and subsequent phases of this study.) In spite of pleas to the contrary by the actor-manager and the agitator, the decision was made to admit all of these people. They were let in, "decontaminated," and promptly given a meal.

At 4:15 PM, the phone call was given regarding the exit problem. The actor-manager received the message, transferred the information to the group, and turned over the problem to Mr. Quest. Mr. Quest instructed the shelterees on the exit procedures.

While the shelterees were preparing for the exit, the actor-manager and the agitator drew Mr. Quest aside, explained to him their position that the group was behaving in a careless and dangerous manner (citing the admission of the last group of late arrivals), and convinced him that he would be endangering his life if he remained with them. He agreed, announced his decision and a rather garbled version of the supporting argument to the shelterees. Then Mr. Quest, the actor-manager, and the agitator left the shelter.

Mr. Knight immediately took over the management of the exit problem, and did a reasonably good job. As in Study 13, considerable prompting was necessary on the part of the AIR representative in the parking lot. Mr. Knight received little cooperation from the rest of the group, and had to assign autos, riders, and drivers with little help from anyone else. Two return trips to the shelter had to be made for missing supplies. Little concern was exhibited over the reading of radiation during the trip (in contrast to Study 13), and no route to Munhall was volunteered. (One was offered when requested by the AIR representative.)

Mr. Knight did add a new dimension to the solution, however. Each available auto had a consignment of riders and, the supplies were divided in such a way that each consignment had some food, some water, and some medical supplies, in the event that they became "separated" during the trip.

The study was terminated at 5:00 PM.

Study 15

The entry and organization period was markedly different from that of the previous two studies. The actor-manager had been publicly assigned as manager by an AIR staff member during pre-shelter processing. He was one of the first people to enter the shelter, and began immediately to organize the group. He had another shelteree climb up on a desk to report the contents of the commode closet. When the person reported that civil defense supplies appeared to be in the closet, the actor-manager forced open the door, and brought out the supplies and guidance materials.

He had registered the people as they entered the shelter, and on the basis of the available information, he began to assign team heads. A 42-year old engineer, with some experience in environmental design of shelter systems, was named head of safety. This man, who will be referred to as Mr. Rock, played a very prominent role in the remainder of the study.

When the siren sound effect was played, the actor-manager closed the shelter door. People arriving shortly after this were admitted readily. As the evening progressed, every person in the shelter became involved with the establishment and organization of the various shelter systems. All EBS messages were being received. Two men were posted at the door to serve as guards. This was done arbitrarily by the actor-manager, in response to the gunshot sound effects, and no question of why this was done was offered by the shelterees. At one point, one of the guards left his post, and was roundly criticized for doing so by Mr. Rock.

The agitator began to suggest to individual shelterees that the manager was making too many arbitrary decisions without counsel of the group. He raised the question of whether or not the democratic process should be favored in the shelter. For the most part, he was ignored by the shelterees, and, at one point, Mr. Rock drew aside the actor-manager and informed him that the agitator was possibly a "dangerous" personality, and that he and the safety team had a plan ready to subdue and tie up the agitator if things got "out of hand."

A meal was served at 9:00 PM, followed by the first group of late arrivals at 9:30 PM. The actor-manager said that the shelter was filled to capacity, and that no late arrivals were to be admitted. He instructed the shelter to ignore the pleas of the late arrivals, and to pay attention to the team reports which were then in progress. The agitator attempted to argue the moral issue, but was told to sit down and be quiet by the manager. Mr. Rock, who by this time had started to carry a hammer in his belt, supported this instruction by moving closer to the agitator.

Furniture had been rearranged and trial sleeping arrangements were being tested when the second group of late arrivals appeared at midnight. The manager promptly instructed the shelterees that under no circumstances were they to engage in conversation with the late arrivals; that they were to ignore them and tend to the business at hand. The guard staff at the door was bolstered. The agitator argued in favor of admitting the late arrivals on the grounds of available space and adequate food and water. He was totally ignored.

By 12:20 AM, the shelter had retired. Two guards were left at the door. The manager stated that only two people at a time would be allowed to smoke during the night, and that this would have to be done at the guard station near the door. Available matches were collected from the shelterees and given to the safety team.

At 2:00 AM, the EBS message announcing looters in the area was received. The manager immediately awakened the entire shelter, and a plan for defense was established and put into effect. This plan was the now typical collection of potential weapons, and building of a barricade out of the shelter furniture. A guard staff already existed, but was given further instructions by Mr. Rock. The entire operation took less than 45 minutes.

At 6:00 AM, the looter "attack" was commenced. Two members of the AIR staff created a noisy disturbance outside of the shelter. This disturbance lasted 15 minutes, during which time the door guard was joined by three others, all of which were armed with improvised clubs, a hammer,

and a screw driver. The four guards remained on-station during the remainder of the night, but only one of them was awake at 7:35 AM when the manager turned on the lights.

During the morning, the barricade was taken down, a meal was served, and the day's activities were organized under close supervision of the manager. A collection of available candy, gum, and snacks was made at the direction of the manager. In contrast to Study 13, these were surrendered immediately and willingly.

At 9:00 AM, five volunteers, including the manager were removed from the shelter. The manager went out as a volunteer because, as he explained it to the group, he would not ask anyone in his shelter to do what he himself would not do. He took the RADEF gear with him, and appointed Mr. Rock to act as manager in his absence.

Mr. Rock began to manage the shelter in the precise image of the departed manager--strictly, and in an authoritative fashion. The agitator, who had been withdrawn and silent since the evening before, again attempted to raise the issue of admitting more people to the shelter. He was once again silenced by Mr. Rock, who stated flatly that no more people would be admitted. Others attacked the agitator by questioning his qualifications regarding the arguments he offered concerning food rationing, etc.

The first blackout, which had occurred at 4:00 AM, had been totally ignored--most of the shelterees were asleep. The second blackout, occurring at 9:30 AM, received an immediate response from Mr. Rock. He turned on the shelter flashlight, and supervised the collection of matches and "anything that will burn," and instigated a search for extra batteries for the flashlight.

The dust storm and the returning volunteers were handled as well as they had been in the previous two studies. The story that the manager had become separated from the group was accepted. It is interesting to note that the returning volunteers were admitted without incident, even though some concern had been expressed earlier in the morning as to whether this should have been done or not.

Some friction appeared in the early afternoon between Mr. Rock and the head of the recreation team. This was heightened by the appearance of the third group of late arrivals at 1:00 PM, whom Mr. Rock refused to admit. The head of recreation became convinced by the agitator that the shelter could accomodate additional people. However, Mr. Rock, supported by the rest of the group, maintained the decision that had been made by the actor-manager the night before. The agitator suggested that some of the food stocks could be passed out the door to the late arrivals, but this suggestion was overruled by Mr. Rock.

After this incident, the shelterees made some attempt at recreation. However, another argument developed between Mr. Rock and the head of recreation, who had been assigned to guard the door. The recreation head considered Mr. Rock's decision not to admit this last group of late arrivals a mistake, totally immoral, and uncalled for. He requested to be relieved of his duties in the shelter, and Mr. Rock did so.

The fire threat esculation occurred as planned, Mr. Rock handling the evacuation plans and preparations in a very efficient manner.

At 3:00 PM, the actor-manager returned to the shelter, and requested to be admitted. He claimed that he and the radiation gear were being held hostage by two others in order that they might gain entrance to the shelter also. (Two staff members were with him, and were prepared to enter the shelter if this were necessary.) Mr. Rock refused to admit him. The manager argued this issue, and offered the radiation equipment in return for the admission of the group. Mr. Rock replied, "You know I can't do that!" Then he instructed the shelterees to ignore any pleas from outside, and to continue about their business. This, it will be recalled, was the same technique employed by the actor-manager the night before. The manager and his "captors" persisted in efforts to gain admittance, but to no avail. At 3:30 they withdrew from the shelter area.

A short time later (at 3:55 PM), the manager returned to the shelter alone and without the radiation gear. When Mr. Rock was satisfied that the manager was alone, he readmitted him to the shelter and reinstated him as

manager. The actor-manager demanded of Mr. Rock why he had not been admitted the first time, captors or not. Mr. Rock replied that he had done what he believed the manager would have done in his situation.

"I figured that they were making you ask to let all of them in--that you really didn't want to get back in if it meant letting in extra people."

At 4:30 PM, the phone message stating the Munhall problem was transmitted to the shelter. The actor-manager announced these instructions, then said they were ridiculous--the group would stay where it was. The group offered no resistance.

A second call was placed to inquire as to the "status of their evacuation plan." The manager declared his intention of staying where they were. The observer requested to speak with the second-in-command. The phone was handed over to Mr. Rock. It was explained to him that the evacuation to Munhall was necessary, and that since his manager was not cooperating, he was now officially in charge and totally responsible for the evacuation. Mr. Rock replied, "I don't take orders from you, sir, I take them from the shelter manager," and refused to discuss the issue any further.

The next half hour saw Mr. Rock gradually convincing the manager that an evacuation would be in order. He volunteered to take a team out of the shelter to monitor the radiation level in the area. The manager agreed, and a two-man team, including Mr. Rock, was dispatched. They left the shelter, went outside the building, and "monitored" the area. They returned to the shelter and reported that the area was safe. The manager agreed that they could now leave the shelter.

The Munhall problem was held in the parking lot, the actor-manager doing his best to leave the decision making to Mr. Rock. The logistics problems of autos, riders, drivers, and selected route required the typical prompting by the AIR staff member. The actor-manager was still looked to for the final decision, however. The exercise was terminated shortly after 5:30 PM.

Study 16

Preface: The plan for this study was different from any of the previous three, and a short summary of the differences might prove helpful to the reader. It was decided to allow a manager to emerge in this study, and to use both the former actor-manager and the usual agitator as agitators. The emergent manager was to be left in command through the entire study, but this had to be changed as a result of indications that the man who emerged as leader had obtained information from a participant in a previous study--information that was contaminating the results of the present study.

The staggered entry period displayed the type of behavior noted in the previous studies. People entered, explored, tried to peer through the mirrors, and eventually settled down. As the entry progressed, some considerations were uttered regarding the necessity of a "captain" and some organization. Mr. Young, a college student in his early twenties, first became apparent by subjecting the commode-closet door to close scrutiny, then observing aloud that it had been forced open before. Without further hesitation, he began to remove the door and soon had the equipment and guidance materials out in the shelter.

The former actor-manager, as planned, began to work with the radiation equipment, and because of his apparent knowledge, was quickly assigned to be head of radiation and safety. Mr. Young was working out of the Shelter Manager's Guide, and while he was not yet officially the manager, he was performing the major management functions of registering people, assigning teams and team heads, etc. Within 45 minutes of the beginning of entry, Mr. Young had been unanimously elected as the shelter manager.

His first address to the group voiced concern about being too young for the job. The shelterees stated complete confidence in him. His first

rule was a rather embarrassed request that they be careful of smoking. The group agreed, and echoed his concern. As he gained confidence, he made it clear to them that as long as they wanted him to be the leader, he was going to act like a leader. This comment was greated with applause and praise. Mr. Young meant what he said.

The shelter door was secured by Mr. Young primarily to keep people from wandering into other sections of the shelter. He also suspected that the siren sound effects were some signal that meant that the shelter was to begin operating at once.

The organization of teams, etc., was done directly from the management guidance, and accomplished quite well. The only fault was that the first four EBS messages were not received. The radio was finally tuned correctly for EBS #5 at 8:30. During this period, Mr. Young became much more confident and began to act in a rather authoritarian manner.

The first group of late arrivals appeared at 9:30 PM. Mr. Young decided not to let them in. The basis of his decision was not clear, but it was accepted by the rest of the group. The former actor-manager and the agitator disagreed with him. Mr. Young's response was to take the hammer from the former actor-manager (who had been "wearing" it as a badge of authority as Mr. Rock had done in Study 15) and to tell everyone to sit down and be quiet.

The former actor-manager, in his position as RADEF head, continued his briefing to the group. They seemed delighted with Mr. Young's positive action toward those who conflicted with his decision about the late arrivals. The evening continued, with Mr. Young thoroughly in control.

Shortly after retiring, the EBS message (#10) requesting how many additional people their shelter could accommodate was received. A discussion was held between Mr. Young, the two agitators, and another young man who was apparently Mr. Young's second-in-command. The two agitators seemed to easily convince Mr. Young that the shelter could accommodate more people. He phoned out that eight more people could be taken into the shelter.

The second group of late arrivals was admitted at 12:00 midnight. When the knock came, the "usual" agitator started for the door with the hammer. Mr. Young told him to sit down; when he didn't, Mr. Young physically forced him across the room and forcibly sat him down along the wall. He then admitted the late arrivals. Mr. Young's fiancee and future father-in-law were part of this group, and both agitators immediately jumped on this. It had become apparent why a change of view on Mr. Young's part was so easy to bring about, and they pointed this out to the group. The group seemed entirely unconcerned with this issue--instead, they supported their leader's apparent fickleness. One older man said, "Don't let those guys bother you, Young, they're just in here to make trouble--they're probably getting fifty bucks a day."

The looter threats, both at night and in the morning, were responded to very minimally. The door was guarded, but no barricade was built or additional planning done. Both agitators attempted to arouse people to do these things, but the feeling of Mr. Young--that there was no real danger--was accepted by the group.

The volunteers were obtained in the morning by Mr. Young and his second-in-command making a list of people to go out--they then ascertained if these people were really willing to "volunteer." The volunteers were removed at 8:45 AM.

The morning blackout caused some concern--someone had mislaid the flashlight. When it was found, everything returned to normal.

The head of radiation (the former actor-manager) was removed from the shelter by a phone call at 10:00 AM. He was removed on the basis of an emergency at a nearby shelter. (He conferred with the project director and told him of his suspicions that Mr. Young was acting on the basis of previous information).

The response to the dust storm and the returning volunteers was far from satisfactory. No "decontamination" of the returning people was done, and observers cited several incidents of "wounds" being bound up with fallout inside them, etc.

The radiation head was returned to the shelter at 11:45. He was admitted without incident. Mr. Young was removed from the shelter for an "emergency" at 12:45 PM. He was extensively interviewed and it was found that he had talked to a participant in a previous study, but he claimed that no specific incidents or information had been related to him. Despite this, he was not returned to the shelter.

Mr. Young's second-in-command took over in his absence, and became thoroughly confused by the events of the afternoon. He refused to admit the third group of late arrivals at 1:00 PM. One shelteree asked for, and received, his cracker ration, and immediately slid it under the door to the late arrivals. The acting manager was dumbfounded, and at a complete loss for words.

The fire threat escalation was lost in a tirade about what to do concerning late arrivals. The acting manager had made a decision and intended to stick by it, but several of the shelterees thought he was in the wrong.

Another management crisis appeared when a shelteree snatched a plum from the community extra food cache without requesting permission. On the previous evening, Mr. Young had announced that any stealing of pooled supplies would be punished by expulsion from the shelter. Both agitators reminded the acting manager of this rule. The best he could do was to mildly reprimand the thief.

At 3:00 PM, the last phone message in the fire problem was received. The acting manager, now under intense pressure, tried to organize for a possible evacuation. An argument developed over what supplies to take with them. It became obvious that the acting manager was rapidly losing cooperation and control. No real plan for evacuation was developed.

Finally, at 4:00 PM, the Munhall problem was presented. People seemed very anxious to leave the shelter, and a playing of the looter-associated sound effects did not deter them from almost immediately leaving the shelter.

The parking lot phase of the problem was handled reasonably well by the acting manager, in spite of little cooperation from the other shelterees. An acceptable route was presented, and a feasible arrangement of drivers, riders, and supply distribution was developed. It was interesting to note that they had to be reminded that Mr. Young was not with them--they decided to leave some supplies in the shelter in the event that he returned.

The exercise was terminated at 4:45 PM.

II. General Qualitative Results and Implications

Staggered Entry

In none of the four studies did the staggered entry procedure yield any concrete evidence of any behavior patterns solely attributable to it alone. As described in the synopses, the shelterees behaved like experimental subjects, and their entry behavior demonstrated two phases--an initial exploring of the environment with particular attention paid to observation ports, "microphones," and "cameras," followed by settling in an available spot, arranging belongings, and finding something with which to occupy themselves until further instructions were given. There was some concern expressed over the whereabouts of other shelterees (people they had seen at initial processing) and some suggestion that there may have been two shelters in use. The question of when the shelter was to be considered "filled" and the door secured was raised in all of the studies.

The staggered entry procedure may have helped Mr. Grace of Study 13 in his emergence to the managership. The suggestion here is that he may have found it easier to organize with 10 people, gradually assimilating others into the budding organization as they arrived, than what he would have found it if all the shelterees had been there from the start.

Primary Purpose Configuration

The configuration of the shelter space as a shabby, but representative, business office resulted in some highly interesting behavior patterns. First of all, people stated disbelief that this was the actual shelter, even though posted signs said that it was. To the majority of the participants, apparently, a fallout shelter should not look like a business office. Several people across studies expressed the opinion that the room through which they had entered the "office" was the actual shelter (it contained a rolled-up rug and no furniture).

These behaviors suggest that most of the people used in these studies: (a) did not know what a fallout shelter looked like, (b) would accept an empty room as a fallout shelter space, and (c) took the posted word of AIR that the office space was the shelter, but maintained personal doubt.

Of further interest was the fact that, in spite of the crowding that became obvious as the shelter entry period continued, in no study was any of the furniture moved or discarded initially. The furniture was distributed and the commode closet opened, only when the emergent or assigned authority said that it was all right to do so. This indicates that the furniture and the locked commode closet were considered to be the property of the experimenters, and were given the respect that other's property is due. The only exceptions to this general pattern were that some people looked through the reports stacked on the bookcase, surreptitiously peeked into the desk drawers, and usually gave immediate attention to the radio.

At no point in any study was any of the furniture discarded from the shelter, even though in Study 14, Mr. Knight discarded some of the belongings of late arrivals. It will be recalled that he mentioned at the time that it might be worthwhile to get rid of some of the furniture, too, but he did not pursue this notion.

Management Factors

It was clear to see in Study 13 and Study 16 that shelterees, left to their own resources, soon recognized the desirability of some organization in the shelter. The comments, previously described, about the need for a "captain" or a "leader" are relevant here. Study 13 also demonstrated that a late-arriving assigned manager might face considerable difficulty in gaining control of the shelter from an emergent leader. It should be here stated that the episodes of Study 13 argue strongly for some symbol of authority of an assigned manager--a badge, a posted notice in the shelter, etc.

The direct, authoritarian style of leadership was found to be highly effective (Study 15), but potentially dangerous (Study 16). In both of these studies, this style of leadership appeared to be totally acceptable

the shelterees. The effects of agitation were greatly reduced, and, was interesting to note, the style of leadership was adopted by seconds--command during the absence of the managers. This style of leadership n perhaps be described as uncertainty-absorbing. Decisions made by both nagers regarding late arrivals, for example, were totally accepted, ether or not they were favorable to admission, and, indeed, even if they re self-contradictory, as in the case of Study 16. This style of leader-ip says, in effect, "I am the boss," and both decisions and the responsibilty r the results of the decisions are the sole property of the leader. This, feel, is the dangerous aspect of this style of leadership, and was displayed Study 16, where the potentially dangerous looter threat was decided to be little consequence by the manager, and, therefore, little preparation was de. The shelterees, moreover, did not question this decision, in spite of tempts by the agitator to get them to do so. It was made, the manager was sponsible, and any uncertainty was thereby absorbed. The strength of such leader could also be seen in Study 15, where direct orders from the co-dinating agency were initially violated during the exit problem.

The attempt by the actor-manager to surrender his responsibilities on e grounds of fatigue was met in Study 14 with hostility rather than sym-thy. It would be complete folly to generalize from this one case, but does emphasize a problem worthy of further investigation. Seconds-in-mmand are willing to take over if the manager is called from the shelter, t the one test case attempted of the manager trying to surrender his duties d remain in the shelter indicates that this is a different issue entirely. might be able to do this if he were physically ill, but to do this on the ounds of fatigue did not receive a sympathetic reaction from the shelterees.

The removal of the actor-manager from the shelter was done primarily to st the ability of the shelter system to cope with the programmed emergencies his absence. It was interesting to note that the actor, as either a de-rted manager (Study 15) or a departed head of radiation (Study 16), had trouble gaining re-entry to the shelter, except when he was being held stage in Study 15.

Agitator Factors

On the basis of the results of these studies, it is concluded that agitators are difficult to use effectively. As our agitator worked, he was useful in keeping the shelterees attentive to the problems presented to them. Many people in the shelter stepped forward with opinions and ideas who would have not done so had the agitator not been present. The trouble is, no matter how involved in the study the participants became, it is painfully obvious that they do not totally forget that they are in an "experiment." Accordingly, they expect "tricks" from the experimenters. Thus, anyone who is verbally at odds with prevailing group opinion is branded a "plant," an "agitator," or a "ringer." In every study at some point, our agitator was accused of being an agitator. The actor-manager was identified as one in Study 16. In Study 13, Mr. Tech was accused of being a plant. He was not, of course, but he was loudly opposing the prevailing group opinion at the time of the accusation.

As previously noted, the effects of agitation are greatly reduced with authoritarian leadership. With this leadership style, the agitator is actually working against the opinions of the leader, and can be quickly silenced. In both cases, manager action was supported by group opinion, as well as both threatened (Study 15) and actual (Study 16) physical force.

Programmed Emergencies

The late arrival situations were the most successful of all of the programmed emerge ies in terms of the extent and the degree of attention and concern given to the problem by the shelterees. Unless this issue was handled immediately by a decision of the manager, long and often heated arguments resulted in the course of reaching a decision as to whether or not to admit late arrivals.

The main thread of concern exhibited regarding late arrivals, and generalized (in Study 14) to the returning volunteers, was that of the question of the moral responsibility of the shelter group to those outside this group. This issue became one basically of whether or not they should

reduce rations and living space in order to "save" others, or rather that they should maintain the existing level of rations and space and thus insure the survival potential of the group as it now existed. It should be noted that in two situations (Study 14 and Study 16), late arrival groups containing friends or relatives of someone in the shelter were admitted in spite of prevailing group opinion to the contrary (Study 14), or management precedent (Study 16).

These facts strongly suggest that the late-arrival problems, as presented, were handled--and even perhaps enjoyed--as academic exercises in debate by the shelterees. When friends or relatives were involved, however, the tone changed to what might be more realistic behavior--let them in! It should be further recognized that the phenomenon of "the group" versus the "experimenters" is relevant here. The shelterees had no way of knowing (except in the two critical cases cited) if the late arrivals were people like themselves, i.e., test subjects, or AIR staff. In the former case, decisions to admit them could well be based upon doing them a favor--seeing that they received their honorarium. In the latter case, decisions not to admit them could be based upon the desire to give the experimenters a "hard time." In no case were these dimensions ever brought to light, but it would be foolish not to admit their possible existence.

It is felt that the episodes exhibited in our studies argue strongly for the continued study of late arrivals as a shelter problem--and suggest the use of split families as a method by which to induce realistic conflict over this issue.

The dust storm, the looter threat, and the fire threat provided exercises for, and tests of, readiness of the various shelter systems involved--radiation, medical, and safety teams. They are of primary usefulness for this purpose. There was no evidence that they produced any but temporary emotional reactions on the part of the shelterees.

The blackout periods resulted in little, if any, concern on the part of the shelterees. As long as there are any light sources in the shelter--flashlights, dosimeter charger, matches, etc., the problem of producing small, but usable, light sources is immediately solved. In order to produce

a problem of anything but minor proportions, blackout periods would have to be extended for much longer periods of time, and/or occur at very crucial periods of shelter operation.

The use of "hostage" incidents, tested in Studies 14 and 15, was abandoned in Study 16. Shelterees were quite willing to discuss and make decisions about these incidents, but they were highly transparent, overdramatic, and generally glib in appearance to them.

One of the most interesting and important indications obtained in these studies was that of the breakdown in management and manager-shelteree cooperation upon the occurrence of the exit problem. The problem itself was not difficult, but there appeared to be a reluctance on the part of the shelterees to "pitch in" and help the person who was acting as chief decision-maker at this point in all of the studies. This result in these studies might have been largely due to fatigue, or even to some extent because they were directly under observation by the research personnel.

In all studies, there was a marked relaxation of personal involvement at this point in the scenario, with the exception of those who were in a position of leadership at the time. As previously described, the announcement of the exit problem was responded to by the majority of shelterees in a non-problem-related way. Packing of personal belongings, primping, and peering through the observation windows were frequent occurrences. In spite of some attempt by the leaders, no concern appeared to be expressed over safety of departure; the possibility of looters or other dangerous elements in the area. (This could be excused somewhat in Studies 13 and 15 where a team had been sent out to observe the area first).

The attitude outside the shelter seemed to be (1) a relief at being out of the shelter, and (2) a mild impatience with the leader's attempts to make a good showing to the AIR representative. (The representative, by the way, was never asked for credentials, even though (1) he was not known to the shelterees; they had not seen him before, and (2) his clothing and appearance were in the same state of disrepair as that of the shelterees. The only symbol of authority he had was a clipboard.)

In general, then, the behavior patterns observed at this time in all of the studies tend to support concern over the maintenance of structure and order in the shelter group upon emergence from the shelter. Post-exit problems are very much worth further development and analysis.

Emergency Broadcasting System

The use of a radio which the shelterees had to turn to the correct frequency to receive the EBS messages produced results having a very important implication. Programming of EBS should be continuous. Discrete messages, as we used, resulted in some messages being missed. If programming had been continuous, it would have been obvious to the shelterees (a) when the radio was initially tuned to the correct frequency, and (b) when, and if, the radio needed to be re-tuned to the correct frequency. Both of these situations were apparent in these studies only if someone were tuning the radio when a message was being transmitted. The system as we used it <u>can</u> work--all messages were received in Study 13 and Study 15--but there is no guarantee that it will work. The more important evidence came from studies 14 and 16, when messages were missed initially because the correct frequency could not be found--tuning attempts were made at times when messages were not being transmitted--and later when the radio had become tuned away from the appropriate frequency.

Comments on Participants' Responses to Attempted Realism

Some comments concerning the response patterns displayed by shelterees to the attempts at increased realism are appropriate here:

1. The shelterees were quite willing to approach the exercise "as if it were real," but only to a limited degree. When discomforting and emotionally-laden situations occurred (such as the first late-arrival argument in Study 13), they could and did remind themselves that "this is an experiment, and <u>not</u> the real thing." Doing this often damped out ongoing emotional involvement with the problem at hand, and thus reduced any emotional stress that may have been produced by the events. The use of the "experiment" argument as a basis for avoiding or solving troublesome, conflict-producing, or threatening situations was best seen in

Study 14, where a woman said that under real conditions, she would be willing to leave the shelter to make room for another person, but that she would not do it in the study because she would lose her subject honorarium.

2. The shelterees in these studies had no problems with what to do with the occasional periods of free or "spare" time--they rested or slept. By increasing the problem load of the exercises, we may have removed a potential cause of in-shelter stress or discomfort--that being finding things with which to occupy one's time.

3. In each study, references were made to television dramas and literature in which the problems of shelters, emergencies, and nuclear attacks had been portrayed. This raises the bothersome question of how much of the exhibited behaviors were "natural" to the shelterees, how much were copied from characters in the dramatizations, and, indeed, if there is any difference between the two.

4. Finally, as an incidental comment, people with no dramatic experience or training can portray a frighteningly realistic late arrival with very minimal instruction. This is mentioned only as an indication that future attempts to produce situations or incidents of interest in a shelter exercise may not necessarily demand the expense of professional actors.

III. Quantitative Results and Interpretations

Materials Brought into the Shelter

Following the example set by the University of Georgia in the spring of 1965, our shelterees received no instructions as to what to bring to the shelter. The variety of items brought and the number of people bringing each class of item is presented in Table III below.

Table III

Categories of Items and Number of People Bringing Each Category to Shelter Stay*

	Study 13	Study 14	Study 15	Study 16	Total
1. Extra clothing	5	8	5	11	29
2. Toiletries	2	10	7	2	21
3. Reading materials	8	12	11	12	43
4. (Recreational materials) Toys, games, playing cards, writing materials	4	8	6	12	30
5. Extra food, beverages, snacks, candies	7	9	7	6	29
6. (Sleeping gear) Sleeping bags, blankets, pillows	1	5	3	2	11
7. (Sleeping gear) Pajamas or nighties	1	1	0	5	7
8. Flashlight or candles	0	2	2	1	5
9. Weapons: a. Knife	0	1	0	0	1
b. Tear-gas pen	0	1	0	0	1
10. Radio	1	1	2	2	6
11. Tools (scissors)	0	1	0	0	1
	29	59	43	53	184

*Includes data from late arrivals, whether or not they were admitted to the shelter.

Radios were confiscated before entry. The special case of weapons would have been, also, had it been known at the time that the shelteree had them on his person. It is quite possible that other people had pocket knives or other weapons on their persons, but these never appeared during the conduct of the studies.

The table suggests that the first five categories (extra clothing, toiletries, reading materials, recreational materials, and extra food) were the most popular. The appearance of sleeping gear was relatively infrequent--had the study been of longer duration, as was the Georgia study, it is quite possible that more of such materials would have been seen.

The number of recorded incidences (bottom row of Table III) increased markedly between Study 13 and Study 14. The inventory lists themselves demonstrated that within the major categories (1-7) the diversity of items expanded as the studies progressed. This unfortunately suggests that some information transfer regarding the shelter conditions occurred at the participant level between studies.

The question remains as to whether or not realistic, expectable behavior was demonstrated here. This almost has to be decided at the individual level--some people appeared with only the clothes on their backs--others appeared to be prepared for an extended camping trip. It is suggested that the former would be the more probable case in the event of a nuclear attack than the latter, at least with a public fallout shelter in a primarily non-residential area.

Pre- and Post-Shelter Tests

Pre- and post-shelter tests (see Appendix B-3) were given to each participant in the studies. The pre and post tests had four identical parts, which were:

Part I Twelve items measuring degree of civil defense information.

Part II Ten items measuring attitudes toward statements about civil defense.

Part III Eight items measuring attitude toward statements about shelter leader characteristics.

Part IV A section where the participant was asked to rate himself along fifteen separate dimensions of "feeling" in regard to being in a fallout shelter.

The post test contained two additional sections, which were:

Part V A rating of twenty different factors of the shelter environment as to the degree to which the person was bothered by these factors during his stay in the shelter.

Part VI A section where each participant was asked to select those people in his shelter who, in his opinion, displayed important behavior patterns, and those from whom he would be most and least willing to take orders in a real shelter stay.

The first four sections of each test were scored as follows:

Part I Score used was number of correct answers.

Part II Scoring scale of one to five, the higher the score, the more positive the attitude toward civil defense.

Part III Scoring scale of one to five, the higher the score, the more the attitude favored the direct, authoritarian, task-oriented leader.

Part IV Scoring scale of one to seven, the higher the score, the more positive the feeling about being in a fallout shelter.

The results from each section of the tests will now be presented and discussed.

The scores of each study group on civil defense information (Part I) are presented in Table IV on the following page

Table IV

Mean Number of Correct Answers on Part I--Civil Defense Information* †

Study	Pre-Shelter Test	Post-Shelter Test
Study 13	4.1	6.0
Study 14	4.2	6.6
Study 15	3.9	6.8
Study 16	3.5	6.4

*Differences within each study were tested by the "difference method" for correlated means (Garrett, 1953) and all were found to be significant at beyond the .01 level.

†Differences between studies on pre-test scores and post-test scores were found to be non-significant by analysis of variance.

The results indicate that all groups acquired civil defense information during their experience as test subjects to a sufficient degree to permit an increase in their scores on the civil defense information test. The usefulness of the shelter exercise as a training device has been more fully established in another effort (cf. Smith, Bend, Jeffreys, & Collins, 1966).

The results from the civil defense attitude (Part II) and the attitude toward leadership (Part III) sections of the tests are shown in Table V on the next page. All study groups demonstrated a slight, but insignificant, increase in score on attitude toward civil defense, indicating a development of more positive attitudes toward civil defense as a result of the shelter experience. Similarly, all groups demonstrated a slight, but insignificant, increase in score on attitude toward leadership. This indicates a trend toward increased favoring of the authoritarian, task-oriented leader as a result of the shelter experience. It should be remembered that these are merely trends, the change in scores on both parts is not significant.

Table V

Mean Scores Obtained on Parts II and III--Civil Defense Attitude and Attitude Toward Leadership

Study	Part II		Part III	
	Pre-Shelter Test	Post-Shelter Test	Pre-Shelter Test	Post-Shelter Test
Study 13	40.14	42.28	33.77	34.23
Study 14	39.34	41.08	34.03	34.83
Study 15	40.23	41.95	35.07	36.20
Study 16	39.00	43.16	35.16	37.16

The data from Part IV of each test--feeling toward being in a fallout shelter--is shown below in Table VI.

Table VI

Mean Scores Obtained on Part IV--Feeling Toward Being in a Fallout Shelter

Study	Pre-Shelter Test	Post-Shelter Test
Study 13	86.59	85.66
Study 14	84.30	79.95
Study 15	92.12*	87.30
Study 16	82.25	79.76

*Significantly higher (.01 level) than Studies 14 and 16 and Study 13 (.05 level) by analysis of variance.

The participants in Study 15 initially had a higher (more positive) feeling toward being in a fallout shelter than did any other three groups. Why this was so is impossible to say. There were no significant differences in

post-shelter scores between any of the study groups. All groups demonstrated a reduction in score following the shelter experience, with Study 14 and Study 15 showing the greatest decreases. These two studies were subjected to the most extensive problem scenarios, and both groups were very active in handling the problems. These facts might well be the fundamental cause of the decrease in positive feeling about being in a shelter.

The results from Part V of the post-shelter tests are shown below in Table VII. In this section, the participant was asked to rate, on a four-point scale, how much he was bothered by twenty different aspects of the shelter environment. Each aspect was scored on a one-to-four scale; the higher the score, the less the person was bothered by the aspect.

Table VII

Mean Scores Obtained on Part V of the Post-Shelter Test*

Study	Score
Study 13	58.23
Study 14	53.79
Study 15	58.25
Study 16	54.68

*Highest possible score = 80;
lowest possible score = 20.

Analysis of variance indicated no significant differences in these scores. Generally speaking, all groups were bothered by the various aspects of the shelter environment to the same degree.

The range and frequency of responses to specific aspects of the shelter environment are interesting to look at because they do differentiate among the four study groups. Table VIII on the following page presents the spectrum of group responses to three aspects of the shelter environment--crowding, inadequate leadership, and lack of organization.

Table VIII

Spectrum of Responses to Three Specific Aspects of the Shelter Environment*

I. Crowding

Study	Not Bothered	Bothered Little	Bothered Some	Bothered Much
Study 13	5	9	48	38
Study 14	0	4	21	75
Study 15	0	15	40	45
Study 16	0	8	52	40

II. Inadequate Leadership

Study	Not Bothered	Bothered Little	Bothered Some	Bothered Much
Study 13	43	19	23	15
Study 14	25	29	38	8
Study 15	80	10	5	5
Study 16	44	16	36	4

III. Lack of Organization

Study	Not Bothered	Bothered Little	Bothered Some	Bothered Much
Study 13	19	23	39	19
Study 14	16	21	50	13
Study 15	70	5	25	0
Study 16	28	24	36	12

*Figures are percentages.

These results suggest the following:

1. The group most bothered by crowding was Study 14, in which all groups of late arrivals were admitted.

2. The group least bothered by inadequate leadership and lack of organization was Study 15, in which the actor-manager played the direct, authoritarian, and task-oriented leader, a style closely emulated by his second-in-command during his absence from the shelter.

The final test result to be presented is the selection by the shelterees of those from whom they would be most and least willing to take orders in an actual, "real" shelter (Part VI of the post test). This data is presented in Table IX on the following page.

TABLE 1A

Nominations of Those from Whom Participants Would Be Most and Least Willing to Take Orders in an Actual Shelter

I. Most Willing to Take Orders From

Nominations	Study 13	Study 14	Study 15	Study 16
People receiving the largest number of nominations	Mr. Grace 19 Mr. Tech 13 Head of Medical 6 Actor-Manager 5	Mr. Knight 13 Mr. Quest 10 Actor-Manager 9	Mr. Rock 15 Actor-Manager 11 Second-in-Command of Safety Team 9	Mr. Young 15 Head of Medical 15 Mr. Young's Second-in-Command 11
Total nominations made by group	59	55	50	68
Remaining nominations distributed across X other shelterees	8	8	7	11

II. Least Willing to Take Orders From

Nominations	Study 13	Study 14	Study 15	Study 16
People receiving the largest number of nominations	Agitator 12	No particular person	Agitator 6	Actor-Manager 14* Agitator 7
Total nominations made by group	55	42	37	53
Remaining nominations distributed across X other shelterees	18	14	15	11

*In this study, the actor-manager served as a second agitator.

The results indicate the following:

1. The people in Study 13 most preferred the emergent leader (Mr. Grace), and did recognize and respect the technical ability of Mr. Tech, even though he had conflicted with the group on several occasions.

2. The people in Study 16 likewise held their emergent manager (Mr. Young) in high regard, even though he had been removed from the shelter. The "vote" was split, however, to the head of the medical team who tried to support and help Mr. Young's somewhat ineffective second-in-command during Mr. Young's absence.

3. Study 14 and Study 15 saw the majority of nominations being given to those who led the group at critical periods. Mr. Knight, in Study 14, took over leadership during the exit problem after the actor-manager had abandoned the shelter. Mr. Rock, in Study 15, was second-in-command during the actor-manager's absence, and also was in charge of the exit problem. It is interesting to note that the head of safety in Study 14, Mr. Quest, as well as the actor-manager, were selected even though they had "abandoned" the group at the time of the exit problem.

4. It was neither surprising nor unexpected that those used as agitators would be selected in the "least willing" category in three of the four studies. It is, on the contrary, difficult to explain the absence of vote concentration on the agitator in Study 14. This result suggests that the agitator did not make his presence felt as much in Study 14 as he did in the other studies.

GENERAL DISCUSSION AND CONCLUSIONS

The discussion will be concerned with two items: (1) what was learned in these studies, and (2) what directions in further research are suggested by the results.

It is both recognized and admitted that the current studies could be attacked as being unsystematic and uncontrolled. As stated before, however, they were exploratory in nature, and designed to investigate the effects of a broad spectrum of events and situations. The desire was not to investigate any one of these aspects systematically, but rather to determine which of these events, singly or in combination, are worthy of further effort.

The question of what was learned can be divided into two parts--what was learned in terms of research techniques, and what was learned in terms of significant content with regard to current OCD policy. Each of these will be discussed in turn.

Research Techniques

First of all, there is an intrinsic circularity in the notion of presenting people with a series of realistic, probable events and then judging whether or not the responses they make are themselves realistic and expectable. How is this judgement made--to what are the elicited behaviors compared--what is an index of "realistic" behavior. If this is known, is there any need for studies such as these?

The answers to these questions, in our opinion, are as follows:

1. There is no existing systematic model of realistic behavior in fallout shelters under actual emergency conditions. Natural emergencies and disasters are contributing bundles of information, however, which could well contribute to the construction of such a model. Similarities and differences between such a model and observed behaviors in studies such as these could yield meaningful insights and predictions in regard to the expectable behavior of people faced with emergency situations.

2. Studies such as these become additionally meaningful if the general responses of the people involved are compared to the general response patterns seen in other, less problem-loaded, studies.

3. Studies such as these apparently do increase the fund of civil defense knowledge of the participants, and likely increase their functional ability to handle emergency-associated situations, as well as their ability to perform on a paper-and-pencil test.

Regarding the current series of studies, it was painfully apparent that the effect of being in an experiment was still operating--including the suggestion of a "contest" between the experimenters and the subjects. The reluctance to forget the experimental aspect of the studies was further reinforced by the use of this aspect as an excuse for non-involvement, as a way to maintain personal comfort, and as a way to avoid the essence of the presented problems.

There is no question that these studies invited and encouraged role-playing on the part of the participants. The frequency of comments such as "We're supposed to play this for real, right?" and "Look, if this were the real thing, we would . . ." indicated that the participants were willing to accept the nature of the studies and act accordingly. (The term "act" is probably well-chosen). The question that does remain is the degree of similarity between this role-playing, and actual behavior in an actual emergency situation.

Two types of situations appeared to produce behavior patterns that were not "acts," as such, and which could be logically expected in a real event. These were: (1) the reluctance to surrender personal comforts for the good of the group, seen in Study 13,* and (2) the concern for friends or relatives who were confronted by a "dangerous" situation. This was seen most graphically in Study 13 (the mother and her volunteer son whom she thought was missing) and in Study 14 (the woman who recognized her husband as being one of the late arrivals).

*It is significant that this attitude did not appear in Study 15 with its authoritarian leadership.

In order for the research technique used in these studies to be properly evaluated in terms of its usefulness and effectiveness, further effort at the conceptual level is necessary to:

1. Develop a model or classification scheme of behavior under emergency conditions, based upon existing descriptions of the responses of people to actual emergency conditions. This could be used as an index of the validity of the responses made to events presented in experimental studies such as these.

2. Analyse the relationship between role-playing behavior and actual behavior, with the idea of capitalizing on any similarities discovered. As these studies found with late-arrival groups, it is easy to get untrained people to act convincingly as thourgh their very lives depended upon gaining admission to the shelter.

Some specific suggestions regarding the technique itself were obtained from these studies:

1. The use of agitators and "assigned" or "emergent" managers in league with the experimenters is not desirable beyond the current point. In spite of the skill with which the people used played their roles, the shelterees have learned to expect such things from psychologists, and as soon as a "plant" is suspected, a great deal of information is lost. A suspected "plant" who is <u>not</u> one, such as Mr. Tech in Study 13, <u>provides</u> information, however. It is easy to think of Mr. Tech being called "infiltrator" in an actual shelter, and for the same reason he was called a "plant" in the study, this being his open conflict with prevailing group opinion.

2. Increased involvement with the beginning and end points of a study, as well as more consistent involvement with the intervening portion, might well be engendered by <u>added</u> structure before the study begins. Some shelterees, particularly those who assumed leadership positions, such as Mr. Grace in Study 13, were concerned with "doing a good job" from beginning to end. They were intrigued and challenged by the attempted

realism. It might be possible to obtain this same degree of involvement on the part of all the participants by a suitable pre-shelter briefing, and the application of a threat, such as a group and individual survival score at the end of the study.

3. Further effort should be extended toward the selection of other technical and psycho-social problems for use in addition to, or in place of, the ones used in the current study. The problems presented by very young, very old, sick, dangerous, or disturbed people come to mind immediately.

Implications for OCD

With the appropriate cautions in mind, the current series of studies suggest several items of interest in terms of fallout shelter policies and practices:

1. A symbol of authority for assigned managers would be very useful. This would help an assigned manager establish control both if he were present initially, and, in the case of his late arrival and encountering of an existing, emergent organization.

2. Additional evidence was found suggesting the effectiveness and desirability of the technically competent, authoritarian style of leadership. Certain elements of danger inherent in this style were discovered and pointed out, however; these being the willingness of the shelterees to do whatever he orders, including the violation of orders from a coordinating agency (the exit problem in Study 15), and to accept decisions and evaluations he makes, even though these might be dangerous to the group (the looter threat in Study 16).

3. Public education regarding the nature of public fallout shelters, particularly the dual-purpose aspect, is desirable.

4. The studies indicated that continuous EBS programming and/or instructions emphasizing the necessity of continuous and careful monitoring of the radio are desirable to insure transmission of EBS information.

5. OCD concern expressed over the continuation of shelter organization and cooperation at the point of exit is well grounded, and further effort needs to be extended toward analysis of, and development of, recommendations to improve this period of the shelter situation.

APPENDIX A-1

PRE-GAME INFORMATION PACKAGE

INTRODUCTION

You are here to participate in the SEARCH program, a shelter manager
ing device. You are asked to act as shelter manager for a large
e building. Regardless of your prior training, considerable common
: will be required, and should suffice in case you have had no training.
the following information carefully, because you will need it later
› your job.

General Information

You are director of Personnel for United Insurance Company. Your
gned duties include interviewing, testing, and hiring all clerical
oyees and agents. You supervise two male assistants (interviewers),
six female clerks and secretaries. This is a new assignment for you
e you have just been transferred to this city, but you know a number
ellow employees from previous association in the company.

You have just been appointed manager for the shelter in your building
.h is described in the following section. Study the information in the
ding description carefully.

LARGE SHELTER

Shelter Areas

The shelter areas in this building are the basement, the third, the fourth, the fifth, the tenth, and the eleventh floors. These areas provide a total of 5,938 shelter spaces. This accounts for:

basement	823
floor 3	1,023
floor 4	1,023
floor 5	1,023
floor 10	1,023
floor 11	1,023
	5,938

Certain areas on the shelter floors will be uninhabitable. These areas are the utility core containing the eight elevators, the three stairwells, the utility and electrical closets, and the maintenance area in the basement containing the boiler room and the air-conditioning room.

The building has been marked and stocked as a fallout shelter through the Federal Marking and Stocking Program. The Office of Civil Defense has stocked the building with food, water, sanitation and medical supplies, and radiological monitoring equipment to last each shelter space for two weeks. These stocks have been placed in the basement of the building and they occupy 9,000 cubic feet, or a space equivalent to 30'x30'x10'. Shelter signs have been posted inside and around the building.

Power System

The 14-floor building houses a large insurance company. The building ituated in the business district of a major city. It is bordered on sides by other office buildings which rise to the seventh floor. The ding receives its electricity, water, and gas from commercial sources. commercial electric power is received into the electrical room in the ment where the master switch, breaker switches, and fuse boxes for the ce building are located. The main electrical conduit is divided into :rous electrical cables which distribute electrical power to all electrical lities in the building. These include the eight elevators, the air- litioning system, the exhaust fans, the lighting, the switchboard in receptionist's room, the alarm system, the telephones, the public address :em, the MUZAK speaker system, and the outlets.

The building is situated in an area which is subject to frequent storms ı high winds. Emergency power facilities have been installed in the lding. The switchboard contains an emergency power supply (battery- trolled) which can operate autonomously if the electricity fails. A nline-driven auxiliary generator located in the maintenance room hooks to all the electrical facilities. It can supply up to ten per cent of mal electrical power. The exhaust from the generator engine is vented ough a duct which connects to the outside at ground level. A fuel storage k buried in the ground outside the building holds enough gasoline to sup- the auxiliary generator for four days continual use.

An in-let tank in the ground receives commercial water. The tank ntains the water pressure in the building. It has a constant capacity of)00 gallons. This tank supplies the building with cold water for the ıatories, water fountains, and cafeteria kitchen. Three 850 gallon -nace boilers in the boiler room heat the building, and a fourth boiler ɔplies hot water for the lavatories and cafeteria kitchen. The boilers ɛ heated by commercial gas.

The freon-filled air-conditioning system includes two compressors, two fans, a filter--all in the air-conditioning room, and a cooling tower on top of the building. The fans in the basement cool the air by blowing it past the air-conditioning coils and circulating the cold air throughout the building by many air vents and ducts. The compressors pump the freon refrigerant and conduct it back to the cooling tower where the freon is recooled.

Physical Layout

The building occupies an area of 11,500 square feet. Its structure is rectangular and its dimensions are 125' long x 92' wide. Fourteen floors are above ground level, and one floor, the basement, is under ground level. Plate-glass windows have been installed on each floor at the front side of the building. These windows do not open and are usually covered by venetian blinds or draperies.

Each floor is divided into one main corridor extending the length of the floor, and five sub-corridors leading to the individual offices. In the center of the floor is the utility core containing the eight elevators, utility closet and electrical closet, and an internal stairwell. Two other stairwells are located at the two sides of the building. All stairwells run from the basement to the fourteenth floor. Each is separated from the main floor area by fire doors. The eight elevators in the building all run from the basement to the fourteenth floor. Two of these elevators are used primarily for freight purposes.

Regardless of the business content of the floor, each floor has two water fountains, four fire extinguishers, a mail chute, a men's room, a women's room and women's lounge. All of these except two of the fire extinguishers are located along the main corridor. A utility closet and electrical closet is on every floor.

Two fire extinguishers are located along the main corridor and two
n sub-corridors. They are water-chemical extinguishers for putting
imple paper and wood fires. The building also has a fire alarm
m which consists of fire alarm bells on each floor. The bell is
[illegible] of the main corridor. Controls for the alarm system
n every floor. There are two control levers along the main corridor
ery floor. Extra controls are located in the maintenance room and
ight guard's office. The alarm system can sound an alarm either in
uilding or at the local fire station.

Most of the offices in the building are lit by flourescent lighting,
ugh some rooms have incandescent lights. Most offices are carpeted.
lavatories, corridor, cafeteria and kitchen, and maintenance floors
tiled. The floors of the boiler room, and air-conditioning room are
of concrete. Most of the ceilings in the building are fitted with
stical tiling. A MUZAK speaker system is in every room in the building.

Business Content

Eight floors of the building contain the insurance offices. Floors
through seven are the offices of the insurance agents, accountants,
ers, and secretaries. Each floor represents a separate insurance
tion (accident, fire, theft, life). Each office occupies an area
17'. Two agents work in an office.

The front offices on the insurance floors are the typing pool areas
the secretaries. Each office has a secretary in the typing pool.

The front center room on the second floor is the insurance reception
n. The reception room has two leather couches, a coffee table, and
chairs. A magazine rack and ashtrays are placed by the couches. In
corner is the reception counter and two receptionists who operate
arge switchboard. Telephone calls to the insurance offices, a public
ress system, an intercom system, and MUZAK speaker system are controlled
e.

Floors eight and nine compose the insurance executive offices. These offices are larger than those of the agents. Every executive has a secretary.

The top five floors (10-14) in the building contain other business and professional offices not related to the insurance company. These include attorneys' offices, doctors' offices, dentists' offices, accountants' offices, loan companies, beauty salons, a wholesale jewelry store, an investment counselor, a wholesale fur company, and a theatrical agency. The rooms on these five floors are structured approximately in the same style as those on the bottom nine floors.

Above the top floor of the building is a flat concrete roof with asphalt and tar covering. The cooling tower unit of the air-conditioning system is located here.

The first floor or main floor of the building is styled as an "arcade." That is, a number of shops or stores which are open to the public compose the floor area. Among these are a coffee shop, a drug store, a cigar and candy stand, a wholesale jewelry store, a haberdashery, a brokerage firm, and a travel agency. Three doors from the street give access to an open hallway area. On the wall of the hallway is a directory of offices in the building. Four telephone booths are in this hallway. Right outside the front hallway is the utility core with the eight elevators.

Next door to the front hallway is a women's room. A men's room is located on the main corridor.

On a sub-corridor is the coffee shop. The shop is visited by the public. It has ten tables and a counter with ten stools. The shop is re-stocked twice a week with canned foods, sugar, flour, pastries, and coffee. A freezer in a storage room in the back of the coffee shop holds an average supply of one week's refrigerated food for the shop.

On the same corridor is a night guard's office. The office measures 'x8'. The guard keeps surveillance of the whole building from 5:00 PM 8:00 AM. His office contains his desk and a steel storage closet. e guard stores his uniform, whistle, and firearms in the office.

The main floor on street level has five front entrances, (two give trance to the drug store and travel agency, three give entrance to the ont hallway), two side entrances, and two back entrances. The sub- rridors are six feet wide, and the main corridor is ten feet wide.

Personnel

The building employs 741 people. All except 15 of these work the gular daytime hours, 8:00 AM to 5:00 PM. The 15 who work during the ght include 10 janitors who clean the building during the night hours, night guard, and people who work in the printing and mailing rooms.

Of the 741 building personnel there are 396 insurance employees 38 of whom are secretaries), 75 professional personnel (dentists, ctors, etc.), their 100 assistants, and 99 salesmen and other employees io rent offices on the upper floors, 15 janitors, 15 cafeteria workers) cooks, 8 assistants, a cashier, and 3 dishwashers), 8 elevator men, receptionists, 30 salesmen and employees who work in the arcade, 2 inting room employees, and 3 mailing room employees. Each shift works different eight-hour period of the day. The janitors possess the keys) all offices, rooms, and arcade stores. The night guard also has a mplete set of keys.

At any given time during the day, the building averages 600 visitors. ost of these are clients of the doctors, accountants, lawyers, and busi- esses who rent the upper floor offices. A lesser number (200) are clients f the insurance company. The rest of the visitors are shopping in the rcade on the main floor.

SUMMARY OF SHELTER DESCRIPTION

THE BUILDING: Floors are 125 feet by 92 feet.
There are 14 stories above ground, and the basement.
Floors 10-14 contain miscellaneous professional offices and small businesses.
Floors 2-9 are used by the insurance company you work for (8 and 9 are executive floors).
Floor 1 (the main floor) contains small shops, open to the public.
The basement is also used by the insurance company. It contains, among other things, a cafeteria and the building operating equipment.
Building population is normally 725 occupants plus 600 visitors = 1,325.

THE FACILITIES: Eight manual elevators run from the basement to the 14th floor.
Three stairwells run from the basement to the 14th floor.

Intercom MUZAK Public address system Telephone system	All run throughout the building, and are controlled from the reception desk on the second floor (front center room).

Coffee shop on the first floor
Emergency power is available.
There is a 3,000 gallon water in-let tank.
All civil defense supplies are stocked in the basement.

THE SHELTER AREAS: Signs are posted outside and inside the building, directing people to the floors which offer adequate fall-out protection. These are: 10 and 11, 3, 4, and 5, and the basement. The upper floors have an assigned capacity of 1,023 each. The basement, 823, giving a total for the building of roughly 6,000.

THE NEIGHBORHOOD: Your building is located in a downtown business district. Buildings on each side of you are seven stories high. There are several other marked shelters within a ten-minute walk, whose location you know.

e panel before you represents your contact with the building which
t been described to you, and all the people in it. When the program
you should visualize yourself as physically present in your office
second floor. Do not treat this as a "test" situation, in which
l an examiner the answer to a question. Treat it as a real s tuation
h you tell people what you want them to do.

l communications must be in writing. In the "output" panel to the
ll appear all further information on the current shelter status
:r pertinent matters. Many of these additional pieces of information
:quire some instructions or action from you as appointed manager in
:o achieve or maintain smooth-running shelter areas.

› react to the "outputs":

irst, be sure you understand the "output".
:cond, decide what, if anything, should be done and who should do it.
ıen write out what action is required on one or more of the blank
cards provided, stating whom you are addressing and how you will
reach him.
inally, drop the original output together with your input card into
the "input" slot on your right.

o understand the system, it will help you to visualize yourself as
ent of a company, alone in your office, thinking of a task which needs
done--say emptying your wastebasket.

YOU WOULD:	THIS IS USED:
who should do it (the janitor)	stating whom you are addressing
how to tell him (through your retary)	stating means of contact
how and when he should do it w)	stating required action

)ue to limitations in the SEARCH program, you must use a separate card
ıch question or directive. The above example illustrates how a single

card might be filled out (in another setting). But the "president" could not have, in one card, ordered his light bulb replaced, his wastebasket emptied, and a desk in accounting moved to the storage room, even though the janitor might logically perform all these tasks. Each should be presented on a separate card. You may experiment a little with this during the game. There will be no penalty involved if your cards are too complex.

Similarly, you must begin a new card any time you address a different person or group.

SEARCH, like many persons, cannot handle a vague order, and will require clarity. If you should be told "the building is on fire," it is not enough to tell your informant to "take care of it." You must arrange for a suitable team with instructions and equipment to be notified and to be at the site of the fire.

The building you are to manage has the same limitations as a real building. If you need equipment or material you must find it in the inventory lists. Nothing can be found that is not named in the inventory, unless you are told of its existence by an "output" from someone. This means that if your plans require a ham sandwich, you cannot logically assume someone has one in their lunch, then act as if you have it. You cannot "invent" anything. Furthermore, finding a thing in the inventory is not sufficient. You must send someone to get it before you have it.

Similarly, when you begin, there has been no prior organization or training for shelter living. You have just been appointed manager, but no deputies have been named, and the occupants of the building have no special assignments or emergency instructions. The only preparations for emergencies are the "to shelter" signs posted inside and outside the building, and the shelter stocks in the basement.

Note the clock on the panel. It will show you the current time in the shelter building. It will run normally, showing the passage of time, except when the system causes a delay beyond your control, when it will be stopped. From time to time the clock may jump forward, indicating a new

ıe in the shelter. It will do this to allow for the estimated time
ıuired by you to implement your orders, or to skip over uneventful
riods.

SUMMARY OF THE RULES FOR SEARCH

No prior civil defense organization or "duty assignments" can be assumed.

No supplies or equipment not listed in inventories can be "created" or "purchased."

"The system" is to be regarded as any person or group of persons in the building. Any person can be spoken to directly.

All communications must be in writing.

Questions may be asked as well as orders given.

Do not turn the output cards over.

Return every card you receive through the "input" slot with your response.

SPECIMEN

INVENTORY OF SHELTER FLOORS

Cafeteria

(240 capacity: 30 tables, 240 chairs)

- Food dollies (5)
  - dish towels (6)
  - food trays (500)
- Tables:
  - salt and pepper shakers (40 each)
  - ash trays (40)
  - sugar containers (40)
  - sugar (300 ounces)
- Waste Caddy (1)
- Swing-Easy Waste Baskets (4)
- Serving Counter:
  - silverware stand (1)
  - silverware
    - knives (700)
    - forks (700)
    - tablespoons (700)
    - teaspoons (700)
  - cash register
  - glasses (700 - 8 ounce)
  - relish stand (1)
  - dinnerware (3,000 pieces)
    - dinner plates (500 porcelain, 10" diameter)
    - soup plates (500)
    - tea cups (600)
    - salad bowls (500)
    - pitchers (10)
    - saucers (600)
  - drinking straws (10 boxes: 500 per box)
  - coffee percolators (2)
- Paper Napkins (30 dispensers: 200 per dispenser)
- Garmet racks (2)

Regular Office

- Desks:
  - desk trays (in-out boxes - 2)
  - calculator (1)
  - pen and pencil holders (2) with pens and pencils
  - file boxes (2)
  - coffee cups (2)

SPECIMEN

INVENTORY OF NON-SHELTER FLOORS

1. Arcade

Haberdashery

Men's Dress Accessories:

- hats
- shirts
- neckties
- socks
- belts
- tie clasps and cufflinks
- umbrellas
- underwear
- sweaters
- wallets
- bathrobes
- pajamas
- gloves
- handkerchiefs
- suspenders

Travel Agency

Brochures and pamphlets
Maps
Globe
Desks
Calculators
Typewriters
Telephones
Filing Cabinets

Wholesale Jewelry Shop

Earrings
Necklaces
Bracelets
Pins
Watches
Rings
Pendants
Sterling Flatware
Clocks
Tea service sets

Coffee Shop

Tables
Chairs
Counter

- coffee cups (200)
- silverware (500 piece set)
- dishware (500 piece set)
- cookware (50 piece set)
- coffee percolators (2)
- taps
- hot plate
- milk shake machine
- napkin dispensers
- salt and pepper shakers

Grill
Dishwasher
Freezer (1,000 lb. food capacity)
Refrigeration cabinets
Milk or liquid dispenser
Food display cases
Storage cabinets

Brokerage Firm

Stock board
Desks
Typewriters
Calculators
Writing materials
Chairs
Teletype machine
Telephones
Reference books
Filing cabinets

APPENDIX B-1

LIST OF MANAGER ACTIONS AND SYSTEM CONTINGENCY CARDS

PREFACE TO CONTINGENCY CARD LIST

This is a list of the managerial actions with which the contingency me is prepared to cope, together with the respective reactions required the operator. This list was drawn directly from the cards used in the lot tests. It does not include tentative expansions which were added te in the series and were inadequately proven.

Many observer cards (those naming a manager's action) bear cross- ferences to other cards. This is excessively cumbersome in "list" rmat, and some simplification has been introduced for the sake of arity.

Some coding devices have been adopted, both in actual observer cards d in this listing, which require some explanation:

Directions to "drop out" or to "sequence" #n refer to the addition or subtraction of the named card to/from the operator's face of the clock. The clock serves as a "tickler file" of information cards scheduled (though not immutably) for future presentation.

Directions in the form "+n minutes" indicate advances to be made in "shelter time" as registered on the panel clock. The player is alerted, if necessary, to these advances by tapping the panel behind the clock.

Directions to "present" a card of a given number are to be carried out immediately after time adjustments.

The gaps and sequencing flaws among card numbers that appear in this listing reflect the editing of unsatisfactory contingency sequences.

The player has no control over the information cards listed below. That is, each card is presented at at its specified shelter time, in spite of any action he takes.

Card Number	Time of Presentation	Text Presented to Player
47	4:00 PM	A steady siren has been heard outside for three minutes. As appointed manager of the public fallout shelter spaces in this building, what is the first step you will take?
48	4:17 PM	A wailing signal on the siren is heard outside. What is the next step to take?
49	4:56 PM	An EBS message has been heard, stating that fallout is expected in your area in 20 minutes.
52	5:25 PM	The plate-glass windows on the 10th and 11th floors have been broken.
53 *	5:45 PM	Radiation monitoring team head to manager: "We've detected some radiation at the windows, but according to the books, it's not dangerous yet."
54	6:40 PM	You have received word that on every floor of the shelter there are between 40 and 50 individuals who are either unwilling, or unable, to perform the tasks to which they have been assigned. They appear to be under severe emotional strain, and have so far resisted the efforts of other shelterees to talk to them and to get them involved in shelter activities. There are no doctors, psychologists, social workers, or other professionals trained to deal with such problems in the shelter.

Card Number	Time of Presentation	Text Presented to Player
55 *	7:45 PM	One of your staff members reports: Fallout has been coming down for over t hours. Radiological monitoring reveals that the part of the 10th floor she area nearest the roofs of adjoining buildings has a radiation reading of fo Roentgens per hour.
56	8:30 PM	One of your staff reports: "Some of the shelterees have inquired about sleeping arrangements."

*Always used at these times, since no player failed to assign someone to the task.

In addition to the inevitable Pre-Sequenced Events specified above, there are those that come about through manager inaction or ineffective action on his part. For the operator's convenience, some of these are posted ahead of time for later delivery, but are put away when the manager performs the appropriate action. This refiling of cards is indicated elsewhere in the Contingency Card List under "Operator Instructions" as "Drop out #n." The cards so handled are listed below.

Card Number

5. The elevator captain calls to let you know that: "People are gathered in worried crowds in front of the elevators on each floor. Large crowds are milling on the first floor. The basement is about jammed with persons seeking shelter. It is getting very difficult to move in the building. Panic seems possible."

24. Report from a member of your staff: "People are piling up at the doorways on the shelter floors. The first ones stop just inside and block the others. It's slowing things down. Some piled up desks are blocking half the basement."

25. Report from a member of your staff: "None of the people in the shelter seem to know what to do. They stand around, asking each other questions, and are very nervous."

26. Report from a member of your staff: "There are crowds of people on stair landings, especially near the bottom of the building. The basement is getting overcrowded. People on the main floor are confused and milling."

27. Report from a member of your staff: "People are streaming into the building. The main floor is crowded with excited people. A couple of shop windows have been broken. I think there may be some looting going on. They are very nervous down there, and it's getting more crowded by the minute."

Number

28. Report from a member of your staff: "We've got an awful lot of people in the building. It's standing room only in the basement and the first floor, and they're working up. There must be 10,000 people down there alone!"

Sequenced Events

Some management actions have effects that do not appear immediately. In this case, the operator, obeying the appropriate "Manager Action" card, posts a report for future delivery. Instructions to post these cards will appear in other sections of the Contingency Card List under "Operator Instructions" as "Sequence #n." The cards so sequenced are listed below.

Card Number

29. Report from security team at the doors: "They've broken through at the drug store door and a side entrance. They're coming like wild and we can't hold them."

30. Report from a member of your staff: "There's a fellow out in front of the building who is working up the crowd out there to break in."

31. Arrival counting team reports: "4,350 people have arrived since we began counting, and there must have been a thousand already in the shelters when we started. They're still coming."

32. Report from arrival counting team: "There are about 7,600 people in the shelters now. I think our assigned capacity is only 6,000 or so."

33. Report from arrival counting team: "You asked me to check back with you. We've reached your limit, and there's no slow down in arrivals."

34. Arrival counting team report: "There are about 7,000 people in the shelters now.

35. Arrival counting team report: "There are about 9,000 people in the shelters now. We're only supposed to have 6,000. How can we stop them?"

38. From head of food and water team to Manager: "There are a whole lot of big metal drums over there, labeled 'emergency drinking water' and they're all empty! There's no telling when the city water may fail, and there isn't a drop in the supplies!"

Player's Error	Card Number	System Reaction
Input does not specify addressee.	40	Whom are you addressing in your last instructions?
Input takes the form, "I would have (someone) ...," as opposed to "(someone), you go and ..."	61	Please direct orders or queries to someone in the building. Do not say what you should do, <u>do it</u>.
Means of communication (at a distance) not stated.	62	How would you let them know?
Input is too vague to be actionable, or desired outcome is stated, without indications of means.	63	Explain specifically what steps you will take to achieve the goal(s) you stated (or what specific actions you want your subordinates to perform). Your statement was too vague.
Player requests information present in information package.	64	That information is available in your information package.
Misunderstanding of information card.	65	Your input indicates you misunderstood the last information. Check it, and modify your input accordingly.
Misunderstood information package.	66	Your input indicates you misunderstood the pertinent background information from the briefing booklet. Check back, and modify your input accordingly.
Overloads response system by ordering <u>series</u> of actions, for which conflicting results are programmed.	68	The system can handle only one item per card. Please divide up your inputs so there is only one question or order per card.

Player Errors--of Form or Clarity (Con't.)

Player's Error	Card Number	System Reaction
Violation of rules for play which is not otherwise covered in this list.	69	You have violated a rule of the game. Check your rule-sheet and modify your input accordingly.
Erroneous assumption regarding state of shelter.	70	An earlier action of yours did not achieve the result you evidently suppose. This prevents some of your recent orders from being carried out. Stand by for reports.
Assigns personnel to work outside the building.	73	The game is not prepared to handle work outside the building. Please withdraw or modify your order.
Vagueness in making assignments.	84	Please explain in more detail how people are to be selected, where you will find them, etc.

Opening the Game

Normal play begins on the following page. The subject knew from the panel clock that it was 4 P.M. As a starting point, he was given a card bearing information as follows:

"A steady siren has been heard outside for three minutes.

As appointed manager of the public fallout shelter spaces in this building, what is the first step you will take?"

This card may initiate a whole series of actions, some useful, some not. Those that are not, are listed under "Initial Delays by Manager." The useful ones follow, under "Initial Actions."

Player Action	Contingent Response of System		
	Operator Instructions	Special Time Advance	Text Presented to Player
INITIAL DELAYS BY MANAGER*			
Attempts to go personally to another floor.	Present card 58	+ five minutes	58. You encounter continuous groups of people in the halls, discussing the situation and stopping you to ask instructions and information. After five minutes of trying, you find it impractical to reach your destination, and return.
Attempts to make outside call.	Present card 59	+ five minutes	59. Operator informs you all lines out are tied up. When a line is free, it is busy. The attempt consumes five minutes.
Attempts to personally do physical work.	60	+ five minutes	60. As you try to work, you are so continually interrupted that you accomplish almost nothing. Five minutes have gone by with nothing to show for it.
Attempts to place a series of inside calls personally.	72 repeat ad lib.	+ one minute	72. You have completed your contact with a person. It has taken a minute.

*The group of actions on this page were inefficient only during early portions of the shelter stay, set arbitrarily at 1 hour. After that time, these contingences were not used.

	Operator Instructions	Special Time Advance	Text Presented to Player
INITIAL DELAYS BY MANAGER			
"Wait and see," "continue business," etc.	Present card 1	- eight minutes	1. Eight minutes have passed. The phone has rung. It is Brown, the Executive Vice-President of your company. He asks: "What is going on with the sirens? I tried to call Civil Defense, and all the lines are tied up."
"I don't know," to Brown	Present card 2	------	2. Brown: "Well, you better find out! If it's an air raid, you have to something pronto!"
"Attack possible," to Brown	Present card 3	------	3. "Well, get the people doing something. We can't just sit around, wasting valuable preparation time. People are just standing all over the halls up here." (hangs up)
"False alarm"; "drill" and "equipment test" to Brown	Present card 4	------	4. "The hell you say! We can't be sure of that. You had better get on this, and either find out for sure we're O.K., or get the people to shelter." (hangs up)

	Operator Instructions	Special Time Advance	Text Presented to Player
INITIAL DELAYS BY MANAGER			
Wrong meaning for siren: to Brown	Present card 6	------	6. Brown: "You idiot! That's the Civil Defense alert that means the city may be attacked! Now get going!" (hangs up)
"Go to family," "go several blocks away," "flee," etc.	Present card 7	+ five minutes	7. You reach the main floor and, looking out at the street, you find it so congested and hectic that you decide not to try leaving, and return to your office.
Turn on radio. Turn on TV.	Present card 8	+ three minutes	8. You have spent three minutes looking for one. There isn't one around. (It is not listed on the inventory.)
Look outside. Open window.	Present card 9	+ three minutes	9. People seem to be moving more quickly than usual. Some are looking up. Most appear to be going about their business.
Call anybody outside building.	Present card 10	+ five minutes	10. All trunk lines are busy within your company. By "pulling rank" you get an outside line. You receive a busy signal. Repeated attempts over a five-minute period yield only busy signals.
INITIAL ACTIONS			
Has someone handle shelter set-up. (There are doormen, or orders to "move 'em back," etc.)	Drop out 24, 5	+ two minutes	11. "Continue" Implicit:* *i.e., no immediate response is required of the system. The player is free to continue giving orders.

	Operator Instructions	Special Time Advance	Text Presented to Player
INITIAL ACTIONS			
People assigned to count arrivals by minute 8.	Drop out 28	+ two minutes	12. Sequence 31 at + 28
"Go to nearest shelter floor" (specified) OR "traffic cops" posted, + "go to shelter."	Drop out 26, 5	+ three minutes	13. "Continue" implicit
Has people serve as floor leaders.	Drop out 25, 5	+ six minutes	14. "Continue" implicit
Has a group serve as runners, messengers.	Subtract one minute from response lag	+ two minutes	15. "Continue" implicit
Uses PA system to order building occupants to shelter.	Sequence: 24 at + 29 25 at + 45 27 at + 25 28 at + 30	+ two minutes	16. "Continue" implicit
18+ guards posted at main floor entrances by + 25 (or "close door" order).	Drop out 27	+ three minutes	17a. "Continue" implicit
Less than 18 guards assigned to main floor doors.	Sequence 29 at + 30	+ three minutes	17b. "Continue" implicit

Player Action	Contingent Response of System (Con't.)		
	Operator Instructions	Special Time Advance	Text Presented to Player
INITIAL ACTIONS			
Arranges to inform those outside about other nearby shelters.	Drop out 30	+ two minutes	18. "Continue" implicit
Orders "close main floor door" (no more arrivals allowed).	Sequence: 29 at + 30 30 at + 37	+ one minute	19. "Continue" implicit
Names supply team head, instructs him.	Present 44 Then advance time	+ four minutes	20. "Continue" implicit
Names Radef head (or team) and instructs.	(No prepared contingency)	+ five minutes	21. "Continue" implicit
Names food and water team (see "organization") or head, and instructs.	Sequence 38 at "now" + 20	+ three minutes	22. "Continue" implicit
Names medical team (see "organization") or medical head and instructs.	(No prepared contingency)	+ three minutes	23. "Continue" implicit

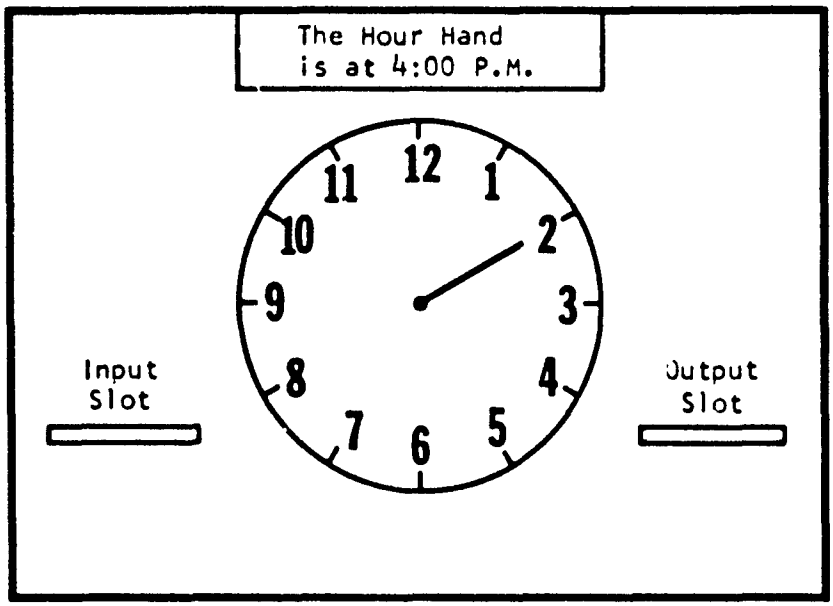
Player Action	Contingent Response of System (Con't.)		
	Operator Instructions	Special Time Advance	Text Presented to Player
ORGANIZATIONAL ACTIVITIES			
Team head told to "get a crew and . . . "	Present card 41	------	41. Team head to Manager: "How many men can I have?"
Calls a team from a group, but names no head.	Present card 42	------	42. Team member to Manager: "Who is boss of the group?"
Unclear or no instructions to team.	Present card 43		43. "I don't understand. Just exactly what are we supposed to do?"
For team assignments that will take them to non-shelter floors.	Present card 44		44. Team head to Manager: "Are you sure they will let us back into the shelter?"
Does not specify equipment location.	Present card 45	------	45. Team head to Manager: "Where is our equipment located?"
Does not specify where work is to be done, where supplies stowed, etc.	Present card 46		46. Team head to Manager: "Where should we set up shop or stow materials and supplies?"

Player Action	Contingent Response of System (Con't.)		
	Operator Instructions	Special Time Advance	Text Presented to Player
ORGANIZATIONAL ACTIVITIES			
Player assigns non-insurance personnel out of specialty.	Sequence 85	------	85. "One-half the people you requested agree to serve. The rest refuse, saying they don't know you or care about you."
If player sends staffer to find more than two or a special (uncommon) type, e.g., executives, maintenance men, executive secretaries.	Sequence 86	------	86. "I can't find the people you want. There are people moving all over the building. Hardly anyone is at their desk, and most are not in their offices."

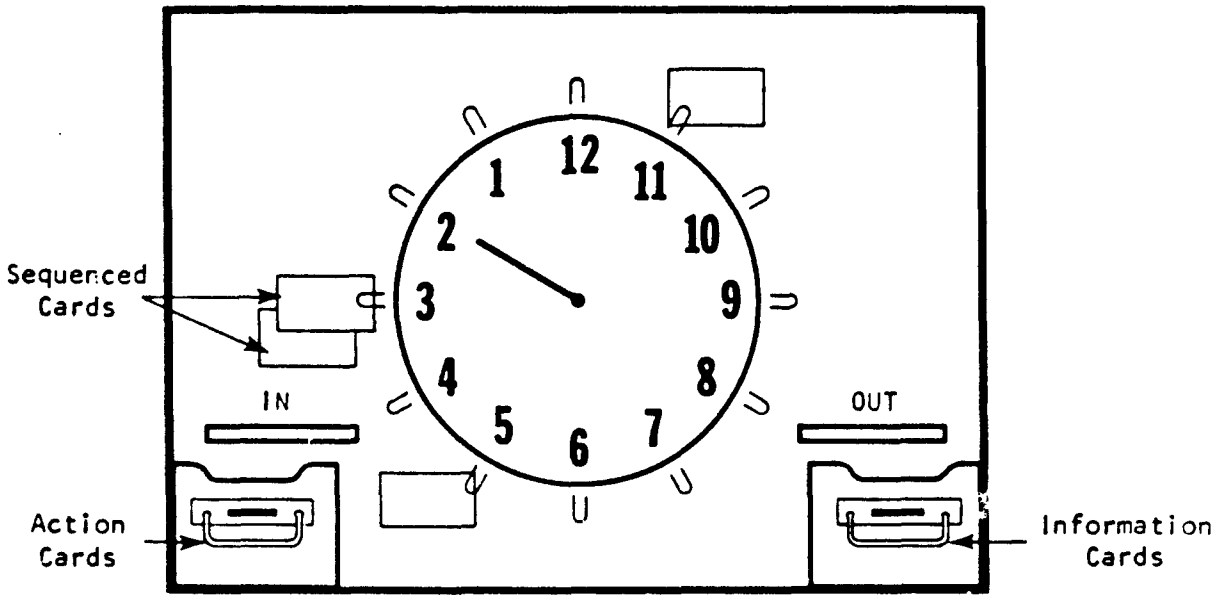
Player's Request	Card Number	Contingent Response of System
"What does the (first) siren mean?"	76	The siren means that an attack is probab in 15 minutes. It took you two minutes get information.
"Those with experience in radiation equipment, report (to me)."	80	The following report themselves availabl 1 male high school physics teacher 3 X-ray technicians (female) 1 male radiologist (M.D.) 1 ex-soldier who had a CBR (chemical-biological-radiological) warfare course in 1957 3 engineers who have used radioactive materials in their work occasionally.
"Can we move the public address microphone?"	87	The master station of the public addres system cannot be moved.
"What does the (second) siren mean?"	88	The wailing siren means that an attack imminent.
Any appropriate request for non-confidential information.	78	Yes
Any appropriate request for non-confidential information.	79	No
Any other information requests.	77	The system is not prepared to answer y question at this time.

APPENDIX C-1

SUBJECT-OPERATOR INTERFACE PANEL



PLAYER'S SIDE



OPERATOR'S SIDE

SUBJECT-OPERATOR INTERFACE PANEL

APPENDIX A-2

Installation of Facilities for Submerged Shelter Laboratory

Ventilation

Air was provided to the submerged shelter by a blower mounted in the van body of a truck. The duct which was to transmit the compressed air to the shelter had to withstand air delivered at about 14 p.s.i. at over 200 degrees Fahrenheit. Because of the temperature a great deal of heat transfer was required in order to lower the air temperature enough to make the shelter comfortable for the subjects. The duct cross section had to be great enough, and the interior surface smooth enough to prevent friction from reducing the pressure differential between the blower outlet and the shelter.

Underwater installation required a material light in weight and easy enough to assemble into a complex shape for divers to install while swimming submerged, without sufficient purchase to apply force or to lift any great weight.

A promising material in pilot tests was a variety of flexible four-inch ducts used for clothes dryers. It was lightweight, inexpensive, would transfer heat adequately, and in preliminary tests, it withstood the required temperature and pressure. Unfortunately, the manufacturer substituted materials between the preliminary tests and the shelter study, and when the substitute material was given a full-scale test at the site, it ruptured above the water line. As a result, a two-inch steel pipe was used to conduct air from this blower to a point approximately six feet from the shelter hatch.

This length of pipe was in three, 21-foot sections. Only the last was completely submerged. Installation of the first two sections was carried out on the surface, thus eliminating the need for diving. These first sections presented problems only in terms of their sheer bulk and weight, but aside from these the installation was fairly simple. The third section, however, presented additional problems. Once in the water it

was impossible for the divers alone to support the weight of the pipe; this necessitated a means of surface support. The support system was subject to specific requirements. It first had to be capable of supporting the weight of the pipe; second, in order to position the pipe, it had to be capable of moving the pipe section in both the horizontal and vertical planes. In view of these requirements it was decided to use one of the pontoon boats that were available at the site. The boat had sufficient buoyancy to support the weight and also enough mobility and stability to position the pipe. Vertical adjustments were made by using nylon line web strap slings. One line was secured at the bow and the other at the stern of the boat. The direct attachment to the pipe section was made with the web strapping. This was accomplished by passing each end of the pipe through a slip loop on the end of each web strap. In this manner the weight of the pipe tightened the loop automatically. The nylon line and web strap were joined by interlocking loops before the pipe was secured in the web strap. The respective lengths for each sling were approximated, and the pipe was moved into position by paddling the pontoon boat to a point directly in line with the existing pipe sections. Final adjustment was made by the diving team and a surface tender. Line signals were used to indicate to the tender whether to play-out or haul-in on individual suspension slings, thus varying the angle at which the pipe was suspended. After the third section was in position, it was threaded into the swing fitting at the end of the second section.

The final operation with the steel pipe involved fitting the adapter for the flexible duct. The adapter consisted of three sections that were assembled under water. The terminal end of the adapter was pre-fitted with a spiral ridge having a pitch corresponding to the pitch of the wire reinforcement in the flexible duct. With this arrangement, the duct could be threaded on to the outside of the adapter and secured with two circular clamps, one at either end of the spiral ridge. Clamping in this manner insured that the duct, once under air pressure, would neither pull over the

ridges or turn on the adapter and become disconnected. The free end of the pipe at the adapter was then lashed to the tower with a nylon line to prevent it from swinging.

The final compressor-to-shelter air connection was made with the plastic duct. In order to prevent the duct from bowing upward when it was filled with air it was placed along the under side of a length of two-inch by four-inch wood. One end of the wood was fastened to the tower, and the other was placed at the underside of the shelter and secured. The duct was then lashed to the wood restrainer to prevent it from slipping. The free end of the duct was lashed to the shelter bottom just below the water level in the center hatch. When air pumping was begun, the pressure cleared the air induction system of water, and the air bubbled through the water below the hatch and into the shelter interior.

In test, this combination performed adequately, withstanding the pressure, and stresses of bouyancy, and delivered sufficient cool air to the shelter to support its proposed occupants. Routine atmosphere checks, however, revealed that significant amounts of CO and noxious combustion products were being introduced in the shelter. These were found to be exhaust gases from the gasoline engine driving the compressor. They were being released too near the compressor's air intake. Airtight ducts were then sealed to both the air intake and the exhaust pipe, both were led outside the truck and terminated about thirty feet apart, with the line between the two open ends perpendicular to the prevailing wind.

When this system was checked, the air entering the shelter was found to be free of contaminants. The final air system delivered about 100 c.f.m. to the shelter, and was able to maintain this for extended periods. The only shortcoming of the system was the rather high noise level in the shelter. Although not a major discomfort to the subjects, it was sufficiently high to make communication with the operations deck somewhat difficult.

Two sources of noise were identified. The incoming air transmitted some engine noise from the blower. This was minimized by placing the mouth of the incoming air duct a few inches below water level in the utilities hatch. Exhaust shelter air leaving the rear hatch (the highest of the open hatches) rose in very large bubbles, expanding as they followed the curve of the shelter hull then breaking free to rise to the surface. This venting process resulted in considerable noise, and efforts were made to minimize it. Duct materials were placed with one end in the shelter and the other at a slightly greater height in the water outside, resulting in something rather like an inverted siphon. It was found that such a system, if unrestricted, resulted in an excessive flow rate, emptying the shelter of air faster than the blower was filling it, which allowed water to rise in the shelter until it covered the duct end, thus stopping the air flow. No means for controlling the flow rate in the vent was available at the site, so the effort was abandoned for this study.

Lighting

The primary lighting system was powered by 110 VAC. Its power line was encased in a plastic hose. This power line was run down the opposite vertical member of the tower to the level of the shelter bottom. At this point the line was passed from the tower to the center hatch of the shelter and under the sub-floor to the center of one of the sidewalls, where it was secured by a large suction cup. These suction cups were also used to secure the sockets for the secondary lighting system. This method of attachment proved quite effective, in that once attached it was quite difficult to remove any of the suction cups. An added advantage was that they required no installation/operation that could possibly puncture the inner wall of the shelter.

The secondary, 6 VAC system received its power from a step-down transformer. The supply line was routed down the same vertical tower

ıember as the line for the primary system. The secondary power line was ılso brought in the center hatch, under the sub-floor, and emerged at :he same location as the primary power line. However, this line terminated in a female plug, making it quite simple to connect the in-shelter circuit :o the supply line. Circuitry for the secondary system was wired in ›arallel and consisted of six lamp units arranged with three on each wall. The units were placed in their proper locations on the wall surface then the line connections from unit to unit were completed. The final line connection terminated in a male plug. Using this system connecting the light circuit involved simply connecting the two plugs to complete the circuit.

Communications

The shelter and operations deck were equipped with two separate communication systems. The primary system, a U.S. Navy "Diver-com", required only a single pair of leads from the tower to the shelter. These leads were passed down one of the tower members and into the shelter through the center hatch. Once inside, the lead was routed under the shelter sub-floor to the large end of the shelter which had been designated as the shelter manager's area. At this point they were tied off to prevent them from being dislocated. The transducer for use in the shelter was then attached to these leads. The transducer had been transported to the shelter in a surplus ammunition case fitted with a valve in order to compensate for the pressure differential between the shelter and the tower. After installation of the transducer the lead was fastened to the tower above the water level and the lead connected to the "Diver-com".

The secondary communication system required one set of conductors for each pair of phones. These conductors were routed from the operations deck to the shelter in exactly the same manner as the leads for the

"Diver-com," with the exception that only one set was installed at the shelter manager's station. The remaining set was installed at the rear of the shelter. The phones for the secondary system were transported to the shelter by again using the sealed ammunition case. As in the case of the lead for the primary system, the lead sets for the secondary system were secured above the water line on the tower to one of the vertical members.

Sanitation

The sanitation kit was placed in a plywood mounting directly over the rear hatch. Before placing the sanitation kit, it was necessary to away a section of the sub-floor over the hatch. The section removed was a square with sides slightly greater in length than the diameter of the hatch. The sanitation kit, in its mounting platform, was then placed over the hole extending partly into the water below the hatch. This hatch had previously been designated as an emergency exit, and for this reason, neither the mounting platform nor the sanitation kit was anchored to the shelter floor. The sanitation can, because it partly extended into the water, was found to float in the mounting. This was eliminated by partly filling the can with water. The water was placed in the can before the plastic liner bag was fitted to the can, thereby making it possible for it to be displaced by the weight of waste material in the liner bag. In the event of the can being filled, the ballast water would have been forced from the can and would not have changed the effective volume of the can.

In addition to the installation of the sanitation kit, a screen was erected between the sanitation and storage area and the general shelter area. A frame for the screen was installed from floor to ceiling. The vertical frame sections, one on each side, were placed six feet from the rear of the shelter. A cross member was attached at the top of the vertical

sections. It served as a brace and also permitted the installation of two eight-inch cotton lines that served as transports for the curtains. Curtains were strung on each line extending from the floor to within three inches of the ceiling center. Curtains were wide enough to permit about eight inches of overlap at the center, and were made of an opaque plastic. The final configuration of the screened area was, then, a rectangle within an elipse. The resulting arches at the sides and top of the screen configuration proved no real problem, in that the sides could be covered by adjusting the plastic screens, and the top was too close to the ceiling to be easily seen over.

Supply Storage and Transportation

Other than CO_2 and CO measuring instruments which were substituted for the standard radiation monitoring equipment, the remaining shelter supplies (medical kit, water drum, shelter crackers, and lemon drops) were all standard shelter rations. These supplies, once in the shelter, were stored by the diving team in the rear-most section of the shelter. The major problem encountered in stocking the shelter was one of transporting the supplies from the tower to the shelter and insuring that they remained intact and dry during the operation. The shelter crackers were easily transported in their sealed metal packages and presented only a minor problem due to their positive bouyancy. Even though the pressure differential caused the cans to partially collapse, the pressure was not sufficient to crush the crackers. The water container was transported filled and required only a minimum of sealing. Both the inner and outer plastic water bags were sealed with furnace duct tape as was the lid on the drum itself. A small hole was punched in the lid of the can and then patched with a length of duct tape before the can was transported to the shelter. This allowed the pressure to be equalized by removing the tape once the drum was in the shelter. Moving the drum through the water to the shelter hatch was easily handled by a single diver. While on the surface the filled water drum weighed over 140 pounds, it weighed only a few pounds once submerged. The most difficult part of the operation

was moving the drum through the hatch into the shelter interior. This operation required that one diver be stationed directly over the hatch in order to pull upward on the drum while a second diver pushed from underneath with one hand on the drum while grasping the edge of the hatch with the other to provide leverage.

The remaining supplies were placed in plastic bags, as much air as possible was purged from the bag, and the bag was then sealed with duct tape. In the case of the larger items with a great deal of positive bouyancy, it was necessary for the diver to haul them down on a line from inside the shelter, while a second diver guided their descent. Smaller items, in sealed plastic bags, were carried to the shelter by members of the diving team.

In addition to the shelter stocks, personal supplies were also required by the shelterees. These were articles of clothing, smoking materials, and sleeping equipment (blankets or sleeping bags). The same procedure for plastic bag sealing and purging was followed in the handling of this equipment. As with the general shelter stocks, it was the responsibility of the diving team to transport this equipment to the shelter using the same methods as described above.

Life Line Installation

With regard to the safety of the shelterees, the need for a life line was recognized prior to the beginning of the study. The line used was a 3/8-inch yellow nylon line. Yellow was chosen for the color of the life line because it was easily visible in the water. The line was attached at three points along its length. The first attachment point was on one of the horizontal tower members above the water line. The second attachment point was a small length of pipe that projected from the bottom of the shelter, midway between the forward end of the shelter

nd the edge of the egress hatch. From this point the line was extended nto the shelter via the egress hatch and was secured under the shelving rea in the shelter. Although it was never necessary to use this line or emergency exit, all shelterees used it during their routine descent nd ascent from the shelter.

APPENDIX B-2

Evacuation and Contingency Procedures for Submerged Shelter Study

EVACUATION PROCEDURES

1. Shelteree dons SCUBA and mask in shelter and ascends with two-man escort team.

2. Upon surfacing, escort team is given another SCUBA for next shelteree, and SCUBA is then removed from shelteree to give to next team.

3. Using two, two-man teams this evacuation can be accomplished very quickly, using seven or eight SCUBA's.

4. Should a shelteree experience difficulty during ascent, he may be held at depth until the problem is solved while the second team completes the evacuation.

5. Divers seven and eight should assist topside unless <u>both</u> evacuation teams experience difficulty, in which case seven and eight form a third team and complete the evacuation.

CONTINGENCIES AND PROCEDURES

I. Compressor breakdown.

A. Alert shelter to initiate frequent CO_2 monitoring.

B. Attempt to restart compressor.

C. Alert all divers.

D. Perform routine evacuation at .06 atmospheres CO_2 or when symptoms become apparent; whichever comes first.

II. CO_2 buildup.

A. Increase air supply as much as possible.

B. Follow routine (I) as required.

III. CO buildup.

A. Check compressor.

B. Follow routine (I) as required (Evacuate at .002 atmospheres).

IV. Detection of oil vapor in shelter.

A. Check compressor.

B. Perform high speed group evacuation if condition persists for three minutes.

V. Noxious odor in shelter.

A. Seek source topside and in shelter.

B. Identify and remove source if possible.

C. If cause cannot be removed, determine toxicity and evacuate if toxic or if unbearably noxious.

VI. Electrical storm.

A. Standby for emergency evacuation.

B. Perform routine evacuation if possible.

VII. Total communication failure.

A. Trouble shoot and repair.

B. Diver down after one minute, standby diver gear up and standby.

VIII. Individual behavior breakdown or other serious emergency (continuous buzzer).

A. Diver down.

B. Standby diver down.

C. Other divers gear up and standby.

IX. Shelteree illness.

A. Remove ill shelteree if:

1. Illness appears serious.

2. Nature of illness may create decompression problems.

B. Check status of life support system and condition of other shelterees.

IMPORTANT

The above contingencies are not necessarily inclusive. Regardless of the emergency, all divers should remain topside until:

1. Directed to descend by the Diver in Charge or,

2. A continuous buzzer indicates a serious emergency.

Should the alarm buzzer sound, only two divers should enter the water until voice communication is established.

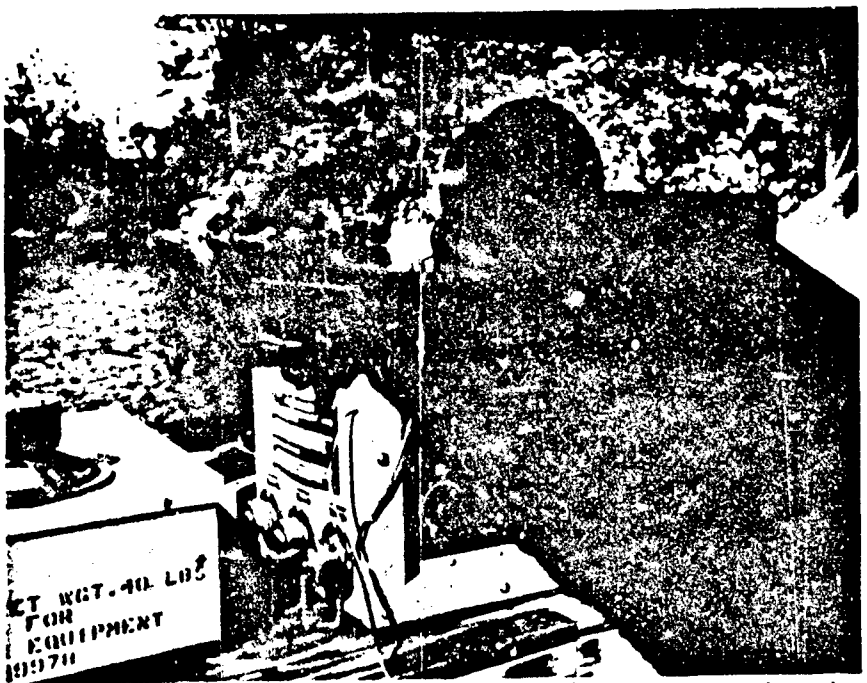
APPENDIX C-2

Photographs of Submerged Study

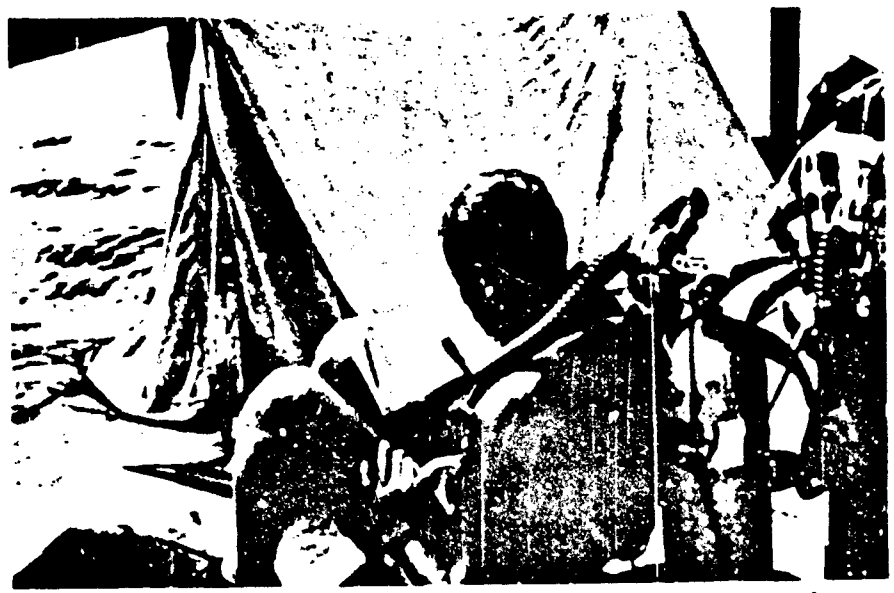
(All Photography by Baylor)

The shelterees donned dry sweat shirts after entering the shelter.

Operations center was located on the tower above the shelter. Note staff member communicating with shore-installation via walkie-talkie.



The "Diver-com" was used as the primary communication link between the shelter and operations center.



Divers on "alert" were ready to enter the water instantly

The integrity of the supporting tower was carefully checked by divers prior to conducting the study.

Two-man diving teams escorted subjects to and from the shelter.

Life line, here being adjusted by diver, was used during shelter entry and egress.

Safety diver checks air duct leading to shelter.

APPENDIX A-3

DESCRIPTION OF SHELTER LABORATORY

DESCRIPTION OF THE LABORATORY

The shelter management laboratory was constructed as a room-within-a-room, with the inner subject space completely surrounded by an observation corridor. Two sizes of subject space could be used: The large, 14 feet by 28 feet, accommodated 40 persons (not used in the studies described in this report), and the small, 14 feet by 14 feet, allowed room for 20. Each permitted approximately 10 square feet per person, in addition to a completely enclosed toilet area, 3 feet by 4 feet. OCD stocks for food, water, sanitation, medicine, and radiation monitoring were stocked in one corner of the subject area in quantities appropriate to the study.

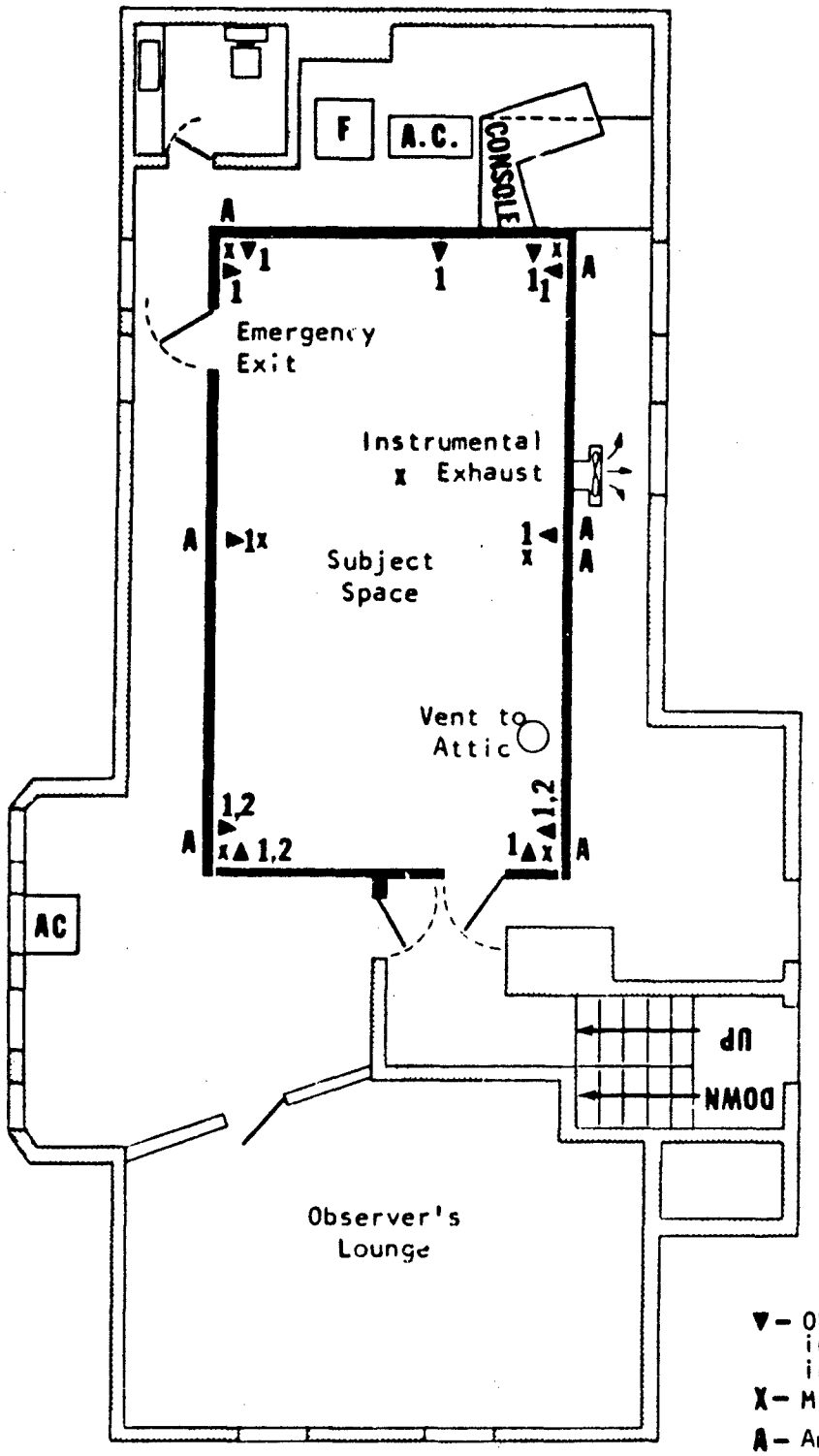
The walls which separated the subject space from the observation area were two-by-four studding, faced on the subjects' side with plasterboard and on the observers' side with Masonite. These walls were soundproofed with rock wool batts stapled between the studding.

A total of 14 one-way viewing ports, each 18 inches by 24 inches were built into the walls. Most of these ports were placed at corners, since this arrangement permitted an observer to view all parts of the subject space from one position. Four ports distributed around the subject space were elevated, so an observer might stand on a platform and look down into the subject area from a height of nine feet, thus preventing one subject from blocking the observer's view of another.

The senior observer's post was a large, low platform with a control console featuring a central grouping of observation, monitoring, recording, shelter lighting, air-conditioning, and inter-observer communications equipment. The post provided a writing and record storage area, as well as space for tape recorders.

Six microphones were distributed around the perimeter of the subject space and one was mounted near the center of the ceiling. By means of patch panels at each observation point, each observer could stereophonically monitor any two microphones, at any desired volume. The senior observer

SHELTER MANAGEMENT LABORATORY



▼– Observation Port (1 indicates port at 50", 2 indicates port at 76")

X– Microphone

A– Amplifier

F– Furnace

AC–Air-Conditioner

had extra patching facilities available and could make tape recordings while continuing to monitor the subjects.

Adjacent to the sound monitoring panel at each observer point, a handset-type intercom unit was installed. This permitted observers to communicate with each other with reduced delay and without withdrawing themselves from their monitoring function. One intercom extension was placed in the shelter to permit direct contact between the chief observer and the shelter manager.

A water-cooled, three-ton air conditioner supplied cool, dehumidified air to the shelter. The vents were placed so as to minimize the subjects' perception of drafts, and the shelter air temperature was controlled manually to assure the maintenance of normal room temperature (68 to 72 degrees). A 3/4 ton, window-mounted air-conditioner was installed to supplement the cooling output of the larger unit.

In-shelter light was provided by 5 incandescent fixtures producing a total of 600 watts and a controlling rheostat was installed at the senior observer's post so that light in the small shelter could be continuously varied to complete darkness. The wiring for the shelter lights was also designed to permit the senior observer to cut the light switch within the shelter completely out of the circuit, thus preventing the shelterees from controlling their own lights. A night light circuit, containing two 25 watt blue lamps, was also provided in the shelter.

Twelve infrared light sources were constructed, each using one 60 or 75 watt incandescent bulb and a 5-1/2 inch diameter infrared filter (Edmond Scientific 60033). Eight were mounted in the ceiling of the small shelter and four in the observation area to improve observation with the infrared viewing devices. These fixtures emitted no visible light and could be used with, or independently of, the two 7-1/2 watt safety lights which normally were the sole source of both visible and infrared lights when the regular shelter lights were off.

To reduce the subjects' awareness of the monitoring procedures, care was taken to eliminate extraneous sounds and lights which could be attributed

to the observers. Supplies and equipment for the laboratory were always selected with an eye toward silent operation. Padding and carpeting were installed in the observation area to silence footfalls. In addition, observers were required to wear tennis shoes. Sources of uncontrollable light were blocked and sealed until absolute darkness was achieved in the shelter and observation area, and opaque, close fit, sliding curtains were later installed on all observation ports.

The air-conditioners and return air blower, in addition to maintaining comfortable atmosphere in the subject space, produced a constant masking (white) noise which further reduced the chance of observer noise being heard by subjects.

Monitoring Equipment Specifications

Seven Electrovoice 664 cardioid dynamic microphones were mounted above the ceiling and aimed downward through five-inch holes masked with grill cloth reinforced by wire mesh.

Each of these microphones, wired for high impedance, fed its signal to a separate Bogen #CHB-10, 10 watt public address amplifier through a 3- to 8-foot shielded cable.

To minimize line loss, two pairs of signal carrying leads were taken from the 8 ohm output of each amplifier and each extended half-way around the outside of the wall separating the observation and subject spaces. At each observation post, seven signal pairs terminated in seven jacks, which were layed out on a panel in such a way that any given jack reflected the position of the microphone associated with it.

Two selector plugs on short leads determined which jacks were being monitored. The leads from these two plugs carried the signal to a pair of L pads so each observer could control his own listening level without distrubing the "master" volume control on an amplifier. The L pads were terminated in a pair of jacks for the observers' binaural 8 ohm earphones. Several types of earphones were provided to offer variety and to suit the personal tastes of the observers. These were: 1 pair Koss PH-30, 1 pair Lafayette F-767, and 1 pair Jensen HS-1 (all the foam-padded, ear-covering style), and two pairs of Lafayette MS-431 (stethoscope style).

APPENDIX B-3

PRE- AND POST-SHELTER QUESTIONNAIRES

PRE-SHELTER TEST

PART I.

Some of the following statements are true, and some are false. Circle the appropriate answer. If you do not know the correct answer, please circle "Don't Know." Do Not Guess.

1.	Fallout from just one bomb may cover thousands of square miles.	True	False	Don't Know
2.	If someone has radiation sickness, you should avoid getting near him so you won't catch it yourself.	True	False	Don't Know
3.	An atomic war would contaminate the water supply and almost everyone would die before the water was fit to drink again.	True	False	Don't Know
4.	An atomic war would destroy all food and ways of producing food, so you would die--even if you were protected by a shelter.	True	False	Don't Know
5.	A plastic suit with filtering mask is plenty of protection against fallout.	True	False	Don't Know
6.	Most fallout rapidly loses its power to harm people.	True	False	Don't Know
7.	After a nuclear attack, if you filter the dust out of the air, the air will be safe to breathe.	True	False	Don't Know
8.	The radioactivity after an attack would make the earth, or some areas of it, impossible to live on for years or even centuries.	True	False	Don't Know
9.	If we are attacked, great weather storms from the explosions would sweep the nation.	True	False	Don't Know
10.	A fallout shelter should have an air-tight door to guard against radiation.	True	False	Don't Know
11.	Any adequate family shelter would cost at least three hundred dollars.	True	False	Don't Know
12.	You can not see fallout.	True	False	Don't Know

PART II.

Please express your opinion about each of the following statements by placing a check-mark on the scale. Please respond to these statements as <u>honestly</u> as you can.

1. There is no good way to avoid the panic which is bound to take place after a nuclear attack.

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

2. If we ever do have a nuclear war, things will be completely hopeless.

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

3. There is relatively little the individual can do to prepare for his own survival in the case of nuclear attack.

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

4. Civil defense training courses should be required in every grade school and high school.

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

5. All the talk and publicity about the possibility of war and the need for civil defense is unnecessary and undesirable.

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

6. There are definite steps the individual can take after an attack to help reduce the panic which could take place.

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

7. An active civil defense program may actually help to prevent attack by an enemy.

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

8. Civil defense really can't do much to insure national survival in an all-out nuclear war.

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

9. The likelihood of a nuclear attack is not great enough to warrant spending a lot more money on civil defense.

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

10. In the event of a nuclear war, civil defense volunteers will make a significant contribution to National survival.

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

PART III.

Please express your opinion about each of the following statements by placing a check-mark on the scale.

1. The only training a shelter leader really needs is in how to protect people from radiation.

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

2. The shelter leader must be the ultimate authority in the shelter.

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

3. Major decisions in shelter should be made by the majority of the group.

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

4. The shelter leader should actively participate in all shelter activities.

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

5. The shelter leader should delegate authority to other shelterees.

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

6. The shelter leader should encourage the shelterees to tell him their personal problems.

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

7. It is important that the shelter leader stick to plans and schedules.

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

8. The most important part of the job of the shelter leader is to set a good example for the shelterees to maintain moral and social standards.

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

9. The shelter leader should encourage public discussion of shelter problems

Strongly agree	/	Agree	/	Neither agree nor disagree	/	Disagree	/	Strongly disagree

10. The shelter leader should always find out what the shelterees want.

Strongly agree	/	Agree	/	Neither agree nor disagree	/	Disagree	/	Strongly disagree

PART IV.

Here is how you are to use these scales:

If you think you feel <u>very much</u> like the adjective at one end of the scale at the time shown at the top of the page, you should place your checkmark as follows:

fair __X__:____:____:____:____:____:____ unfair

or

fair ____:____:____:____:____:____:__X__ unfair

If you think you feel <u>quite a bit</u> like the adjective at one or the other end of the scale (but not extremely), you should place your checkmark as follows:

fair ____:__X__:____:____:____:____:____ unfair

or

fair ____:____:____:____:____:__X__:____ unfair

If you feel <u>only slightly</u> like the adjective at one or the other end of the scale (but not really neutral), you should place your checkmark as follows:

fair ____:____:__X__:____:____:____:____ unfair

or

fair ____:____:____:____:__X__:____:____ unfair

The direction which you check, or course, depends upon which of the two ends of the scale seem most characteristic of your mood or reaction at this time.

If you consider your reaction <u>neutral</u> (or if the scale is completely <u>irrelevant</u>), then you should place your check-mark in the middle space:

fair ____:____:____:__X__:____:____:____ unfair

IMPORTANT: (1) Place your check-marks in the middle of the spaces, not on the boundaries.

THIS NOT THIS

fair _____:_____:_____:_____:__X__:_____:_____ unfair

(2) Be sure you check every scale--do not omit any.

(3) Never put more than one check-mark on a single scale.

(4) Do not look back and forth through the items. Do not try to remember how you checked similar items earlier in the questionnaire. Make each item a separate and independent judgment.

How do you feel now about being in a fallout shelter?

good _____:_____:_____:_____:_____:_____:_____ bad

relaxed _____:_____:_____:_____:_____:_____:_____ tense

angry _____:_____:_____:_____:_____:_____:_____ friendly

confused _____:_____:_____:_____:_____:_____:_____ assured

alone _____:_____:_____:_____:_____:_____:_____ together

kind _____:_____:_____:_____:_____:_____:_____ cruel

aimless _____:_____:_____:_____:_____:_____:_____ directed

strong _____:_____:_____:_____:_____:_____:_____ weak

useful _____:_____:_____:_____:_____:_____:_____ useless

active _____:_____:_____:_____:_____:_____:_____ passive

bored _____:_____:_____:_____:_____:_____:_____ interested

pleased _____:_____:_____:_____:_____:_____:_____ annoyed

uncertain _____:_____:_____:_____:_____:_____:_____ self-confident

serious _____:_____:_____:_____:_____:_____:_____ humorous

hot _____:_____:_____:_____:_____:_____:_____ cold

POST-SHELTER TEST

PART I.

Some of the following statements are true, and some are false. Circle the appropriate answer. If you do not know the correct answer, please circle "Don't Know." Do Not Guess.

1.	Fallout from just one bomb may cover thousands of square miles.	True	False	Don't Know
2.	If someone has radiation sickness, you should avoid getting near him so you won't catch it yourself.	True	False	Don't Know
3.	An atomic war would contaminate the water supply and almost everyone would die before the water was fit to drink again.	True	False	Don't Know
4.	An atomic war would destroy all food and ways of producing food, so you would die--even if you were protected by a shelter.	True	False	Don't Know
5.	A plastic suit with filtering mask is plenty of protection against fallout.	True	False	Don't Know
6.	Most fallout rapidly loses its power to harm people.	True	False	Don't Know
7.	After a nuclear attack, if you filter the dust out of the air, the air will be safe to breathe.	True	False	Don't Know
8.	The radioactivity after an attack would make the earth, or some areas of it, impossible to live on for years or even centuries.	True	False	Don't Know
9.	If we are attacked, great weather storms from the explosions would sweep the nation.	True	False	Don't Know
10.	A fallout shelter should have an air-tight door to guard against radiation.	True	False	Don't Know
11.	Any adequate family shelter would cost at least three hundred dollars.	True	False	Don't Know
12.	You can not see fallout.	True	False	Don't Know

1. There is no good way to avoid the panic which is bound to take place after a nuclear attack.

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

2. If we ever do have a nuclear war, things will be completely hopeless.

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

3. There is relatively little the individual can do to prepare for his own survival in the case of nuclear attack.

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

4. Civil defense training courses should be required in every grade school and high school.

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

5. All the talk and publicity about the possibility of war and the need for civil defense is unnecessary and undesirable.

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

6. There are definite steps the individual can take after an attack to help reduce the panic which could take place.

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

7. An active civil defense program may actually help to prevent attack by an enemy.

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

8. Civil defense really can't do much to insure national survival in an all-out nuclear war.

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

9. The likelihood of a nuclear attack is not great enough to warrant spending a lot more money on civil defense.

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

10. In the event of a nuclear war, civil defense volunteers will make a significant contribution to National survival.

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

PART III.

Please express your opinion about each of the following statements by placing a check-mark on the scale.

1. The only training a shelter leader really needs is in how to protect people from radiation.

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2. The shelter leader must be the ultimate authority in the shelter.

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3. Major decisions in shelter should be made by the majority of the group.

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

4. The shelter leader should actively participate in all shelter activities.

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5. The shelter leader should delegate authority to other shelterees.

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6. The shelter leader should encourage the shelterees to tell him their personal problems.

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7. It is important that the shelter leader stick to plans and schedules.

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

8. The most important part of the job of the shelter leader is to set a good example for the shelterees to maintain moral and social standards.

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

Strongly agree	/	Agree	/	Neither agree nor disagree	/	Disagree	/	Strongly disagree

10. The shelter leader should always find out what the shelterees want.

Strongly agree	/	Agree	/	Neither agree nor disagree	/	Disagree	/	Strongly disagree

PART IV.

Here is how you are to use these scales:

If you think you feel very much like the adjective at one end of the scale at the time shown at the top of the page, you should place your checkmark as follows:

fair __X__ : ____ : ____ : ____ : ____ : ____ : ____ unfair

or

fair ____ : ____ : ____ : ____ : ____ : ____ : __X__ unfair

If you think you feel quite a bit like the adjective at one or the other end of the scale (but not extremely), you should place your check-mark as follows:

fair ____ : __X__ : ____ : ____ : ____ : ____ : ____ unfair

or

fair ____ : ____ : ____ : ____ : ____ : __X__ : ____ unfair

If you feel only slightly like the adjective at one or the other end of the scale (but not really neutral), you should place your checkmark as follows:

fair ____ : ____ : __X__ : ____ : ____ : ____ : ____ unfair

or

fair ____ : ____ : ____ : ____ : __X__ : ____ : ____ unfair

The direction which you check, or course, depends upon which of the two ends of the scale seem most characteristic of your mood or reaction at this time.

If you consider your reaction neutral (or if the scale is completely irrelevant), then you should place your check-mark in the middle space:

fair ____ : ____ : ____ : __X__ : ____ : ____ : ____ unfair

IMPORTANT: (1) Place your check-marks in the middle of the spaces, not on the boundaries.

					THIS	NOT THIS		
fair	____	____	____	____	X	____	____	unfair

(2) Be sure you check every scale--do not omit any.

(3) Never put more than one check-mark on a single scale.

(4) Do not look back and forth through the items. Do not try to remember how you checked similar items earlier in the questionnaire. Make each item a separate and independent judgment.

How do you feel now about being in a fallout shelter?

good	____	____	____	____	____	____	____	bad
relaxed	____	____	____	____	____	____	____	tense
angry	____	____	____	____	____	____	____	friendly
confused	____	____	____	____	____	____	____	assured
alone	____	____	____	____	____	____	____	together
kind	____	____	____	____	____	____	____	cruel
aimless	____	____	____	____	____	____	____	directed
strong	____	____	____	____	____	____	____	weak
useful	____	____	____	____	____	____	____	useless
active	____	____	____	____	____	____	____	passive
bored	____	____	____	____	____	____	____	interested
pleased	____	____	____	____	____	____	____	annoyed
uncertain	____	____	____	____	____	____	____	self-confident
serious	____	____	____	____	____	____	____	humorous
hot	____	____	____	____	____	____	____	cold

PART V

Please rate each of the following factors by circling whether it bothered you MUCH (you could hardly stand it), SOME (annoying, but not too bad), LITTLE (you really don't think it was too bad), NONE (it did not bother you at all).

a.	Behavior of other shelterees	NONE	MUCH	SOME	LITTLE
b.	Boredom	NONE	MUCH	SOME	LITTLE
c.	Sleeping difficulty	NONE	MUCH	SOME	LITTLE
d.	Crowding	NONE	MUCH	SOME	LITTLE
e.	Lighting	NONE	MUCH	SOME	LITTLE
f.	Dirt	NONE	MUCH	SOME	LITTLE
g.	Food	NONE	MUCH	SOME	LITTLE
h.	Inability to concentrate	NONE	MUCH	SOME	LITTLE
i.	Inadequate leadership	NONE	MUCH	SOME	LITTLE
j.	Lack of exercise	NONE	MUCH	SOME	LITTLE
k.	Lack of organization	NONE	MUCH	SOME	LITTLE
l.	Lack of privacy	NONE	MUCH	SOME	LITTLE
m.	Lack of water for washing	NONE	MUCH	SOME	LITTLE
n.	Noise	NONE	MUCH	SOME	LITTLE
o.	Odors	NONE	MUCH	SOME	LITTLE
p.	Physical symptoms (headaches, constipation, etc.)	NONE	MUCH	SOME	LITTLE
q.	Too much organization	NONE	MUCH	SOME	LITTLE
r.	Temperature and humidity	NONE	MUCH	SOME	LITTLE
s.	Toilet facilities	NONE	MUCH	SOME	LITTLE
t.	Being observed through window and microphones	NONE	MUCH	SOME	LITTLE

PART VI.

1. List the 5 people you believe exhibited the most leadership behavior during your shelter stay (other than the shelter manager). List either by name or number:

_____ _____

_____ _____

_____

2. List 5 people you believe exhibited the fewest leadership behaviors during your shelter stay. List by name or number:

_____ _____

_____ _____

_____

3. List the 5 people you believe adjusted best to the shelter environment. List by name or number. Do not include the shelter manager:

_____ _____

_____ _____

_____

4. List the 5 people you believe were the poorest adjusted members of your shelter group. List by name or number:

_____ _____

_____ _____

_____

5. List the 5 people who most actively participated in meaningful shelter activities (other than the shelter manager). List by name or number:

_____ _____

_____ _____

_____

6. List the 5 people who participated least in meaningful shelter activities. List either by name or number:

_____ _____

_____ _____

_____

7. List the 3 people you would be most willing to take orders from during a real shelter stay. List by name or number:

_____ _____

_____

8. List the 3 people you would be least willing to take orders from during a real shelter stay. List by name or number:

_____ _____

_____

9. List the organizations or groups you were a member of during your shelter stay. This includes task teams such as food and medical as well as family or social type organizations.

_____

_____

_____

_____

_____

_____

_____

APPENDIX C-3

SOUND EFFECTS TAPE

PHONE MESSAGES

EMERGENCY BROADCAST SYSTEM SCRIPT

SOUND EFFECTS TAPE

(Played Through Speakers Outside the Shelter)

6:45 PM: Steady siren.

7:00 PM: Wailing siren. Start reducing volume at 008. ABRUPT CUT OFF.

11:15 PM: Gun fire.

1:45 AM: Clanking.

6:00 AM: Breaking in.

9:00 AM: Explosion. SHUT OFF PROMPTLY.

Noon: Big explosion.

2:40 PM: Sirens.

PHONE MESSAGES

PM-1 (Given when Karl calls out in response to EBS #9--about 10:45 PM, Friday night.)

Take his report, then say: "All right. We expect that you will have to remain in your shelter for two weeks. Plan your shelter program accordingly. When radiation levels permit, we will send out relief teams with additional supplies if you need them."

PM-2 (Called into the shelter at 1:00 PM, Saturday afternoon.)

"Is this Shelter 7 in Shadyside? (Wait for answer.) This is Captain Wilenski at Operations Control. We've received reports that there is a fire in your area. At the moment it is under control, and is of no danger to your shelter. We will inform you if any change in the situation occurs."

PM-3 (Called into the shelter at 2:00 PM, Saturday afternoon.)

"Shelter 7 Shadyside? (Wait for an answer.) This is Colonel Robertson at Operations Control. The fire in your area appears to be spreading. There is still no immediate danger to your shelter. Stand by for further word on this."

PM-4 (Called into shelter at 2:30 PM, Saturday afternoon.)

"Shelter 7 Shadyside? (Wait for an answer.) Colonel Robertson at Operations Control. The fire in your area appears to be out of control. You may have to evacuate your shelter. We'll let you know if this becomes necessary, but in the meantime, you should prepare for evacuation."

PM-5 (Called into the shelter at 4:00 PM, Saturday afternoon.)

"Shelter 7 Shadyside? (Wait for an answer.) Colonel Robertson at Operations Control. Fallout levels have cleared sufficiently for you to exit the shelter. Now, we want you to do this: Take your medical supplies and your water, and evacuate to the Munhall area. We are reorganizing this Pittsburgh district at the Homestead Hospital in Munhall. (If they inquire about the fire, say: "As far as we know, the fire in your area is under control.") Now listen carefully. Our helicopter teams report that the Homestead High Level Bridge is jammed with abandoned cars, so don't take that route. By the way, do you have vehicles at your disposal there? How many of your people drove to the shelter? O. K., do the best you can--we will send a man to your area to assist you. He is as much in the dark as you are, so submit your plan for evacuation to him. (If they ask who this guy is, say: "Dr. Hale.") O. K., so that's water and medical supplies, and some route other than the High Level Bridge. O. K.? (Answer any questions he raises.) Meet Dr. Hale outside the shelter building."

EMERGENCY BROADCAST SYSTEM SCRIPT

(Presented Via Tape Recording Through Shelter Radio)

EBS #1 TO BE PRESENTED Friday, 7:05 PM RUNNING TIME 2:50

CONTENT

ATTENTION. ATTENTION. This is the Emergency Broadcast System. Take shelter immediately. Take shelter immediately. This is not a drill. Repeat: This is not a drill. An enemy attack is being launched against the United States. Take shelter immediately and stay tuned to this frequency for further instructions.

THE ABOVE MESSAGE IS TO BE REPEATED THREE TIMES, WITH 15-SECOND INTERVALS.

EBS #2 TO BE PRESENTED Friday, 7:10 PM RUNNING TIME 0:40

CONTENT

ATTENTION. ATTENTION. This is the Emergency Broadcast System. We have just been informed that the city is now on the emergency power system. Please inform the control center if your shelter is without lights. Repeat: The city is now on the emergency power system. Please inform the control center if your shelter is without lights. We also have . . . we also have word here that there has been no confirmed report of a missile strike in this area. There has been no confirmed report of a missile strike in this area.

EBS #3 TO BE PRESENTED Friday, 7:15 PM RUNNING TIME 0:50

CONTENT

(Phone is heard ringing in background.)

ATTENTION. ATTENTION. This is the Emergency Broadcast System. A missile attack has been launched against the United States. Reports about the attack are fragmentary and unconfirmed. The strategic missile bases west of the Mississippi appear to have borne the brunt of the attack. As of this moment, there has been no official report of a nuclear detonation in our immediate vicinity. Fallout has begun to descend on the western portions of our city and is expected in other areas imminently. Do not communicate with the emergency operations center unless absolutely necessary.

EBS #4 TO BE PRESENTED Friday, 8:00 PM RUNNING TIME 3:00

CONTENT

ATTENTION. ATTENTION. This is the Emergency Broadcast System. Stay tuned for an important message. (DISTANT VOICE: O. K., stand by now. We've got a remote from Washington.) Static . . . Noise. Another voice: This is a report from the emergency national command post in Washington. The President and his key civilian and military aides have been safely evacuated to the emergency seat of government. This evening at 6:35 PM, the enemy launched an attack against the strategic retaliatory forces of the United States and its NATO allies. An intelligence warning allowed us to launch a portion of our land-based missile force against the enemy's remaining strategic forces. Polaris missiles have also been launched. In addition, our airborne alert and a portion of our ground alert forces have been sent against the enemy's non-missile strategic forces. Our damage assessment reports indicate that many of our SAC bases have been destroyed or severely damaged. A number of communities near SAC bases have also suffered great damage. The fallout monitoring network reports that radiation is heavy in the western portion of our country and is increasing in

the midwest and eastern portions of our nation. Although there have been several nuclear detonations in the east, it appears as if these have been the result of errant missiles, rather than a planned attack against population centers. The President, whom, I repeat is alive and well, will address the nation as soon as his command duties permit. This is the end of the Priority One report. Local EBS stations may resume Priority Two broadcasting.

EBS #5 TO BE PRESENTED Friday, 8:30 PM RUNNING TIME 0:25

CONTENT

ATTENTION. ATTENTION. This is the Emergency Broadcast System. Short wave monitoring has disclosed that our air strike forces are currently launching attacks on the enemy homeland. These forces are utilizing a new . . . what? What do you mean it's not for release? (Another voice: Priority One. Now . . . for heaven's sake! Announcer: Well what the hell . . . ?) THIS MATERIAL CUT OUT.

EBS #6 TO BE PRESENTED Friday, 8:50 PM RUNNING TIME 1:15

CONTENT

Has this one been cleared?

ATTENTION. ATTENTION. This is the Emergency Broadcast System. We have just received word that the President has been evacuated to sea in the floating Whitehouse. The location of this ship is unknown. The floating Whitehouse is a battlecruiser, fully equipped for command and control functions. Our Government has survived the attack. I repeat, our Government has survived the attack.

EBS #7 TO BE PRESENTED Friday, 9:30 PM RUNNING TIME 1:20

CONTENT

ATTENTION. ATTENTION. This is the Emergency Broadcast System. We have just been informed that a message is to be delivered from the Governor's office in Harrisburg. Please stand by.

This is a report from the Governor's office in Harrisburg. The state of conditions in Pennsylvania is serious, but not critical. Erie has been severely damaged by what is believed to have been a stray missile. No other cities have reported being hit, but the fallout level is rapidly increasing, particularly in Western Pennsylvania. Apparently neighboring states have borne the brunt of the attack, particularly those in the western portions of the country. All citizens should seek shelter immediately. Do not attempt to evacuate your area until you are instructed to do so. Local law enforcement personnel should remain in their respective areas. State police have been assigned to more critical areas, and additional state aid will become available and be assigned when fallout levels permit.

EBS #8 TO BE PRESENTED Friday, 9:45 PM RUNNING TIME 1:15

CONTENT

ATTENTION. ATTENTION. This is the Emergency Broadcast System. Fallout began to descend on the Pittsburgh area several hours ago and radiological monitoring reports indicate that radiation levels are dangerously high in many parts of our city. No one should attempt to leave shelters. Repeat: No one should attempt to leave shelters. Youngstown, Ohio, and Erie, Pennsylvania, have suffered damage as a result of nuclear detonations. As of the moment, there have been no nuclear blasts in our immediate area. The municipal power has been temporarily disrupted in some parts of the city. Power should be restored shortly. No further official reports on our retaliatory attacks on the enemy homeland are available. Unofficially,

the absence of any significant second wave of enemy attack, plus the size of our surviving strategic force, allows cautious optimism that we will suffer no further major damage from any attack. Until further word is transmitted by this station, everyone must remain in shelters.

EBS #9 TO BE PRESENTED Friday, 10:30 PM RUNNING TIME 1:45

CONTENT

ATTENTION. ATTENTION. This is the Emergency Broadcast System. In order to evaluate the damage to Pittsburgh, the emergency operations center requests every shelter to gather the following information and to report it to the local emergency operations center. Is this a fallout or a blast shelter? How many persons are in the shelter? How many of these persons are injured? How many persons are suffering from radiation sickness? What is the condition of your equipment? Is your shelter structure damaged? Do you have adequate electricity? Do you have adequate ventilation? What is the state of your food supplies? What is the state of your water supply? Do you have any illness other than radiation sickness? As soon as we have received reports from district control centers, we will relay such information on to you. When emergency missions are possible, disaster teams will be sent to those shelters which need medical supplies, food and water. Attempts will also be made to report specific areas of damage in our city. Please stay tuned for additional announcements.

EBS #10 TO BE PRESENTED Friday, 11:30 PM RUNNING TIME 0:35

CONTENT

ATTENTION. ATTENTION. This is the Emergency Broadcast System. We have hundreds of people in the area who do not have shelter with an adequate protection factor. They must be moved to other shelters in order to survive. Please advise the emergency operations center as to the number of additional people you can take into your shelter. This is imperative.

Please inform the emergency operations center as to the number of additional people you can take into your shelter.

EBS #11 TO BE PRESENTED Saturday, 1:30 AM RUNNING TIME 0:30

CONTENT

ATTENTION. ATTENTION. This is the Emergency Broadcast System. Radiological monitoring teams report that the radiation levels in the Pittsburgh area are still high. However, there is no additional accumulation of radioactive dust. The fallout on the ground is beginning to decay. It is simply a matter of waiting out this decay time before we can undertake further civil defense measures. Everyone is to remain inside until further notice. Please do not leave your shelters.

EBS #12 TO BE PRESENTED Saturday, 2:00 AM RUNNING TIME 1:20

CONTENT

ATTENTION. ATTENTION. This is the Emergency Broadcast System. Reports have been received that there are bands of looters wandering about the city. Attempts have been made to loot shelters in this area. Be alert to this situation and act accordingly. Security police will begin patrolling the area as soon as the radiation level permits.

EBS #13 TO BE PRESENTED Saturday, 6:00 AM RUNNING TIME 2:15

CONTENT

ATTENTION. ATTENTION. This is the Emergency Broadcast System. Stay tuned for an important message. O. K., stand by to switch.

MUCH STATIC . . . . . ."Please stand by."

This is a Priority One report from the Emergency National Command Post in Washington. It appears that the enemy attack is over. There have been no further reports of missile strikes since early last evening. Radio monitoring indicates no further enemy air activity. Damage assessment reports indicate that the brunt of this attack was borne by western states. Many of our SAC bases have been destroyed or severely damaged. Communities near SAC bases have also been severely damaged. The central and eastern portions of the Country have escaped extensive damage although stray missiles have struck some of the smaller population centers. Fallout is moving across the Country in an easterly direction, carried on westerly winds. All citizens should remain in shelters until instructed otherwise by local civil defense commands. The President and key members of his cabinet are still aboard the U. S. S. Northampton. The President will address the American people as soon as his command duties permit. This is the end of the Priority . . . this is the end of the Priority One report. Local EBS stations may resume Priority Two broadcasting.

EBS #14 TO BE PRESENTED Saturday, 7:30 AM RUNNING TIME 0:45

CONTENT

ATTENTION. ATTENTION. This is the Emergency Broadcast System. Emergency teams have been established and have begun to operate in various sections of Pittsburgh. There is a shortage of able-bodied men to serve on work details in Shadyside, East Liberty, Bloomfield, and Morningside. Will all shelters submit to the emergency operations center the names of able-bodied volunteers who may be asked to leave shelters before radiation levels are completely safe for permanent exit. Phone the names into the emergency operations center. Further information will be provided as to when and where the rescue volunteers will report.

EBS #15 TO BE PRESENTED Saturday, 10:00 AM RUNNING TIME 1:30

CONTENT

ATTENTION. ATTENTION. This is the Emergency Broadcast System. Weather monitoring teams report that there is a severe storm approaching the Pittsburgh area. What's that? It appears that this storm is bearing with it a radioactive cloud and we expect the levels of radiation to increase severely. Some shelters do not have adequate protection facilities against this cloud. There is a possibility that some shelters will have to mobilize and be moved. (PAUSE) We will contact these shelters by phone within the next few minutes. Please do not call the emergency operations center. If your shelter is one of these that has to be mobilized and be moved, we will contact you. Please stand by.

EBS #16 TO BE PRESENTED Saturday, 3:00 PM RUNNING TIME 1:00

CONTENT

ATTENTION. ATTENTION. This is the Emergency Broadcasting System. Radiological calculations of fallout levels in Pittsburgh indicate that permanent exit from some shelters will be possible in the near future. At the present time, recovery teams are surveying the city to locate and to prepare facilities for post-shelter operations. It is imperative that you do not attempt to leave your shelter without prior notice from the emergency operations center. There are still many dangerous radiological "hot spots" in the city. Therefore, regardless of the radiological readings in your immediate vicinity, wait for official notification from your government in the emergency operations center.

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13 ABSTRACT

The research program reported was composed of three major efforts: (1) the initial development of and the feasibility testing of a large-shelter contingency game for use in the analysis of problems associated with large-shelter management, (2) the development of techniques for and the feasibility of the use of an underwater shelter as a method for producing an experimental analog of the threat associated with actual shelter habitability, and (3) the design and execution of four 24-hour habitability studies to investigate the effects of increased realism of a shelter stay, in terms of the number and range of problems presented to the shelterees and the realistic representation of other aspects of the expected shelter environment under the condition of nuclear attack.

Results of these efforts indicated that (1) the contingency game is a meaningful and feasible technique by which to explore problems of large shelter management, (2) the condition of being underwater appeared to produce anxiety which was reflected in part, by marked attentiveness to atmospheric monitoring tasks in the shelter, an attentiveness that appeared to be greater than that exhibited to the analogous task of radiological monitoring in the shelter studies, and (3) some knowledge of the concept of dual-purpose shelters is desirable on the part of the public; EBS programming should be continuous; authoritarian leadership is most effective, but there are some potentially dangerous aspects in its use; and concern over the maintenance of group discipline at shelter exit is definitely called for.

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14. KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
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